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WARC—79: RADIO REGULATIONS AND FINAL PROTOCOL

HEARING

BEFORE THE

COMMITTEE ON FOREIGN RELATIONS
UNITED STATES SENATE

NINETY-SEVENTH CONGRESS

SECOND SESSION

ON

TREATY 97-21, RADIO REGULATIONS (GENEVA, 1979) AND FINAL PROTOCOL (THE RESULT OF THE WORLD ADMINISTRATIVE RADIO CONFERENCE, 1979)

MAY 18, 1982

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WARC—79: RADIO REGULATIONS AND FINAL PROTOCOL

TUESDAY, MAY 18, 1982

United States Senate,
Committee on Foreign Relations,
Washington, D.C.

The committee met, pursuant to notice, at 10:20 a.m., in room 4221, Dirksen Senate Office Building, Hon. Charles McC. Mathias presiding.

Present: Senator Mathias.

Senator Mathias. The committee will come to order.

Today the Committee on Foreign Relations will hear testimony on the Radio Regulations and Final Protocol which resulted from the World Administrative Radio Conference [WARC] held at Geneva in 1979.

The first panel consists of various representatives of the administration who will give us first the administration's views.

Gentlemen, have you determined in which order you would like to speak? If not, I would suggest Mr. Salmon speak first.

STATEMENT OF WILLIAM C. SALMON, ACTING COORDINATOR FOR INTERNATIONAL COMMUNICATIONS AND INFORMATION POLICY, DEPARTMENT OF STATE

Mr. Salmon. Thank you, Mr. Chairman.

We appreciate the committee's fitting this issue into its very full calendar, and particularly appreciate your personal interest and attention to this very important matter. While each of us has prepared statements, we would like to briefly excerpt from those.

Senator Mathias. All of the prepared statements of this panel will appear in the record in full. Please feel free to summarize them.

Mr. Salmon. Thank you, sir.

The 1979 Radio Regulations and its associated Final Protocol, now before the Senate for its advice and consent to ratification, represent the decisions of the 1979 World Administration Radio Conference, better known as WARC–79. The main purpose of that conference was to review and revise as necessary the International Telecommunication Union's [ITU] radio regulations concerning the table of frequency allocations to radio services and the related technical aid procedural provisions pertaining thereto.

The conference itself was the largest international telecommunications event ever held. It drew more than 1,700 delegates from 142 nations. The preparatory effort in the United States began 5 years before the conference and involved all parties with an interest in the use of the radio frequency spectrum, the various Federal agencies, radio service providers, users and manufacturers, and the general public.

The U.S. delegation, consisting of 69 members and supported by staff in both Geneva and Washington, was most ably directed by Ambassador Glenn Robinson. It is the view of this administration that the conference was successful with respect to accomplishing the important objectives sought by the United States.

Many specific goals were achieved exactly as proposed by the United States, and most other conference decisions were fully acceptable to the United States in their final form. However, on a small number of issues the U.S. delegation submitted reservations designed to achieve flexibility for this country in meeting certain important national communications requirements.

The purpose and content of the reservations are described in the Department's report to the President and mentioned in the President's report to the Senate. Other witnesses here today may speak in more detail about the specifics of the conference decisions relative to their respective responsibilities.

The Department wishes to call to your attention the need to maintain in force the reservation taken by the United States in connection with the ITU's 1974 Maritime Radio Conference decision. It is the Department's intention that this reservation be communicated to the Secretary General of the ITU in the instrument of approval.

The new radio regulations come into force on January 1, 1982, for those governments indicating their approval. It is important for the United States to implement the WARC-79 decisions nationally as soon as possible in order to take advantage of the many new provisions which the United States sought and achieved at the conference.

It is also very important for the United States to be in general alinement with other countries on the use of the frequency spectrum due to the strong international character of telecommunications.

In closing, the administration urges your early and favorable action with respect to advice and consent to ratification of the 1979 radio regulations and final protocol.

Thank you, Mr. Chairman.

[Mr. Salmon's prepared statement follows:]

PREPARED STATEMENT OF WILLIAM C. SALMON

The 1979 Radio Regulations and its associated Final Protocol, now before the Senate for its advice and consent to ratification, represent the decisions of the 1979 World Administrative Radio Conference (WARC-79). The 11-week Conference, which was held in Geneva in late 1979, provided the first general review of the use of the radio spectrum since 1959. The main purpose of WARC-79 was to review, and revise as necessary, the ITU's international radio regulations concerning the table of frequency allocations to radio services and the related technical and procedural provisions.

The Conference itself was the largest international telecommunications event ever held, drawing more than 1,700 delegates from 142 nations. The preparatory effort in the United States began 3 years before the Conference and involved all parties with an interest in the use of the radio frequency spectrum—the various Federal agencies, radio service providers, users and manufacturers, and the general public. The U.S. Delegation, consisting of 69 members and supported by staffs in both Geneva and Washington, was directed most ably by Ambassador Glen Robinson.

Our objectives at the Conference were reflected in nearly a thousand individual proposals to modify, add to, or delete from the existing Radio Regulations. The principal U.S. objective was to provide the frequency allocations to satisfy expanded requirements and accommodate new radio services, such as direct-to-the-home television and remote sensing via satellites. Of equal importance was the need to maintain certain existing frequency allocations which are in heavy use and for which there has been extensive financial investment made by U.S. operators. Also, the U.S. Delegation sought improvements in the existing technical and regulatory provisions of the Regulations.

It is the view of this Administration that the Conference was successful with respect to accomplishing the important objectives of the United States. Many specific goals were achieved exactly as proposed by the United States, and most other Conference decisions were fully acceptable to the United States. However, on a small number of issues the U.S. Delegation submitted reservations designed to achieve flexibility for the United States in meeting certain important national communication requirements. The purpose and content of the reservations are described in the Department's Report to the President and mentioned in the President's transmittal to the Senate. It will be some time yet before the United States will be able to fully determine the actual impact, if any, of the decisions involved. The other witnesses here today will speak in more detail about the specifics of Conference decisions relative to responsibilities.

The Department wishes to call to your attention the need to maintain in force the reservation taken by the United States in connection with the ITU's 1974 Maritime Radio Conference decisions. It is the Department's intention that this reservation be communicated to the Secretary General of the ITU in the instrument of approval.

It should be noted that the WARC-79 did not have the task to consider large parts of the Radio Regulations dealing with specific services. The Conference agenda, however, did include consideration of the need for future radio conferences dealing with specific services. After much discussion, the Conference recommended a program of future conference through 1987 to deal with high frequency broadcasting, space services and the use of the geostationary orbit, and the mobile services, among others. The U.S. Delegation concurred in the recommended Conference program, although the delegation felt—and this Administration continues to believe—that the proposed schedule is over-ambitious and places an extremely heavy burden on the limited resources of the ITU and its members. Since the Conference, U.S. representatives to ITU meetings have pressed for a stretching out of the program. Some success has already been achieved in this regard and efforts will continue at the ITU Plenipotentiary Conference scheduled for Nairobi, Kenya during September and October of this year. The recommended conference program is not a part of the treaty under consideration for ratification.

The new Radio Regulations came into force on January 1, 1982, for those governments indicating their approval. It is important for the United States to implement the WARC-79 decisions nationally, as soon as possible, in order to take advantage of the many new provisions which the U.S. sought and achieved at the Conference. It is also very important for the United States to be in general alignment with other countries on the use of the frequency spectrum due to the strong international character of telecommunications.

In closing, the Administration urges your early and favorable action with respect to advice and consent to ratification of the 1979 Radio Regulations and Final Protocol.

Senator MATHIAS. I have several questions, but perhaps it would be more efficient to hear the whole panel and then put my questions to you all at one time.

Mr. Jansky.

STATEMENT OF DONALD M. JANSKY, ASSOCIATE ADMINISTRATOR FOR FEDERAL SYSTEMS AND SPECTRUM MANAGEMENT, NATIONAL TELECOMMUNICATIONS AND INFORMATION ADMINISTRATION, DEPARTMENT OF COMMERCE

Mr. JANSKY. Thank you, Mr. Chairman.

I am Don Jansky, Associate Administrator with the National Telecommunications and Information Administration [NTIA] of the Department of Commerce. I am pleased to be here this morning and to have the opportunity to express the support of my organization for prompt Senate approval for the treaty to implement the results of WARC–79.

I am here representing the executive branch of the Government's requirements for the results of WARC–79. This role of managing and authorizing the Federal Government's use of radio stems from Section 305 of the Communications Act of 1934.

In this connection, we are responsible for managing and authorizing over $60 billion invested in telecommunications systems. It is from this basis that our participation in the conference derived. We are assisted in the management of the Federal radio spectrum use by the Interdependent Radio Advisory Committee [IRAC], established by the then Secretary of Commerce, Herbert Hoover, in 1922.

Virtually every Government entity, including Congress and the FCC, hold authorizations to use the spectrum issued by NTIA. I shall abbreviate my remarks and include the text within the committee's proceedings.

Our activities for preparing for this conference started back in the 1974 timeframe. I think it is fair to say that we established a rather elaborately representative mechanism for hearing and obtaining all the views of the executive branch of the Government. These views over time were coordinated extensively with our joint manager of the spectrum, the Federal Communications Commission, and culminated in a rather substantial submission on the part of the United States in the form of proposals numbering over 900.

Insofar as the results of the conference, there were many favorable results. This [indicating] is the document that resulted. It represents the technical, regulatory and allocation results which came from the conference.

With regard to the fact that we can and are now in a position of wanting to move forward, many government systems are awaiting international recognition pending approval of this document. These include such things as the global positioning system and earth resource satellite systems which were successful in obtaining new allocations at this conference.

I think it is fair to say that the United States engaged in many preparatory efforts and its efforts were larger than those of the rest of the world combined. We were quite successful in obtaining the results that we did.

In conclusion, I would simply like to reemphasize our feeling that this treaty should receive the advice and consent of the Congress at the earliest opportunity.

Thank you.

[Mr. Janksy's prepared statement follows:]

PREPARED STATEMENT OF DONALD M. JANSKY

Thank you, Mr. Chairman, for this opportunity to express the support of the National Telecommunications and Information Administration (NTIA) for prompt Senate approval of the treaty to implement the results of the 1979 World Administrative Radio Conference (WARC–79).

RESPONSIBILITIES OF NTIA

NTIA is the Executive branch agency that is responsible under the 1934 Communications Act for managing the Federal Government's own use of the radio frequency spectrum. See 47 U.S.C. Sec. 305 (1976). Federal agencies have a major stake in efficient and effective radio frequency management. The Government makes use of about half of this national resource. It has about $60 billion invested in telecommunications systems of all kinds that are dependent upon the spectrum. Government purchases account for about half of the total value of shipments annually in the telecommunications equipment sector. 1982 U.S. Industrial Outlook at p. 232. In its management of Federal radio spectrum use, NTIA is advised and assisted by the Interdepartment Radio Advisory Committee (IRAC), established by then-Secretary of Commerce Herbert Hoover in 1922. Virtually every Government entity, including Congress and the FCC, holds authorizations to use the spectrum issued by NTIA.

NTIA'S INTERNATIONAL CONFERENCE ROLE

Radio waves obviously cross international political boundaries, and their use has thus long been subject to international treaties and other agreements. By virtue of NTIA's central role as the Executive's radio spectrum manager, NTIA has played and will continue to play a major policy formulation and coordination role in conjunction with international radio conferences.

Whenever there is an international radio conference on the horizon, the IRAC—which we chair and support—typically establishes a special ad hoc group to focus on conference preparatory efforts. This ad hoc group is usually made up of senior engineering and other officials from various Federal departments and agencies. The group is chaired by a member of the NTIA staff.

The ad hoc group is primarily responsible for preparing the Executive branch's positions. It does this by considering the needs and concerns of the departments and agencies that are represented on the IRAC. The ad hoc group considers any proposals for change that are advanced, and it also may comment on the proposals that are advanced by other countries, to the extent that they are known. The final set of U.S. proposals for the conference is arrived at after thorough coordination with the Federal Communications Commission (FCC) where necessary and appropriate.

PREPARATION FOR THE 1979 WARC

The United States started its preparatory work for WARC–79 in early 1975. All of the Federal agencies involved recognized that this international conference would involve the most difficult preparatory effort ever undertaken.

We faced two principal tasks. The first was to examine trends in radio spectrum use since the last international conference of a similar nature in 1959, and to determine where changes in both the allocations and regulatory provisions were necessary due to advances in the state of the art and operational requirements that had subsequently arisen. Our second, and perhaps more difficult task was to predict what additional changes were likely to occur over the next 20 years, or until the next conference with terms of reference permitting a similar updating was convened.

Nineteen Federal agencies worked together on the conference preparation, under the organizational guidance of NTIA. Twenty Radio Service working groups provided advisory inputs to the FCC. About 500 people were involved in the preparatory effort, and there were more than 100 meetings conducted before a final set of U.S. proposals was agreed to. The final document that was sent to Geneva had 913 specific proposals, and it consisted of a volume containing 11 subdocuments and 394 pages.

THE 1979 CONFERENCE

The 142 member administrations of the International Telecommunication Union (ITU) sent more than 2,000 delegates to WARC–79. For 11 weeks, from September 24 through December 6, 1979, the 69 U.S. conference delegates presented and defended the U.S. proposals.

One of our chief concerns going into the conference was the potential for its politicization, and consequent departure from the technical and operational concerns that traditionally have been predominant in the ITU, in contrast to other specialized UN agencies.

In the first few days of the conference, a few member administrations did display some political motivation. But predictions that the conference would become severely politicized did not materialize. Some divisions did arise along functional and economic lines, and administration did tend to fall into partnership when they had similar problems and concerns. Many of the administrations of the lesser-developed nations, which sent small delegations, tended to lean on each other for support, for example. The predicted East-West or North-South confrontations, however, did not arise in any serious fashion.

During the first few weeks of WARC–79, the conflicts among a tremendous number of proposals appeared insurmountable, and based on our pre-conference experience in trying to resolve differences, it seemed as though a consensus would not be reached in the time allowed. As the conference progressed, however, would not be reached in the time allowed. As the conference progressed, however, the various proposals began to coalesce into well defined options and a consensus did begin to develop. When a member administration found the resulting consensus unacceptable, the common practice was to establish a footnote to provide specific exceptions. This practice was extensive, and as a consequence, the number of new and modified footnotes increased significantly.

Some classes of radio communications service were more popular and better supported among the delegates. U.S. proposals concerning radio services with a military or defense connotation, for example, were the least popular and the hardest for which to obtain wide support. Radiolocation was the best example, due to its association with military radar systems. The U.S. proposals for earth exploration satellite allocations, however, were surprisingly well received. This is probably due to some good salesmanship during the pre-WARC bilateral discussions, and a slide display set up in the lobby. Both evidently helped to present this particular radio service as a necessary and correct earth resources and scientific requirement.

As the conference was concluding, it became apparent that some U.S. interests were not going to be fully satisfied by the Final Acts, and it would therefore be necessary for us to take appropriate actions in the form of reservations or so-called protocol statements. I believe that these reservations serve to highlight the U.S. position on these subjects, and will provide us with the freedom of action necessary to continue to satisfy our radio communications requirements.

OUTCOME OF WARC–79

I think that in the final analysis, the overall outcome of WARC–79 proved considerably better than most of the U.S. participants initially expected. Some radio services, such as radiolocation, suffered some setbacks and unwanted restrictions. In the main, however, I believe that we achieved a good foundation to guide the future radio spectrum needs of the U.S. for the foreseeable future.

The large number of specialized conferences which WARC–79 established to carry forward the detailed work of the ITU does represent a significant challenge. A number of these future conferences address the idea of detailed planning for vital radio services, such as (a) the space services, (b) the broadcasting satellite service, (c) the mobile service, and (d) the HF broadcasting service.

Our principal concern here is the apparent desire of some lesser developed countries for planning approaches that tend to be too detailed, and thus too restrictive, in terms of satisfying unexpected future requirements and the ability to adapt to new technology. This trend toward overly rigid *a priori* spectrum planning must be countered with innovative ideas that preserve the latitude for evolutionary developments, while still providing equitable access for those administrations that feel insecure about their ability to obtain spectrum support for their own, at this time, not clearly defined needs.

CONCLUSION AND RECOMMENDATIONS

I believe that the United States should ratify the Final Acts of WARC–79, and I therefore urge the Senate to give its advise and consent to this treaty.

Senator MATHIAS. Thank you very much, Mr. Jansky.

Mr. Schaefer.

STATEMENT OF KALMANN SCHAEFER, ASSISTANT TO THE CHAIRMAN FOR INTERNATIONAL COMMUNICATIONS, FEDERAL COMMUNICATIONS COMMISSION, ACCOMPANIED BY DR. STEPHEN J. LUKASIK, CHIEF SCIENTIST, FEDERAL COMMUNICATIONS COMMISSION; AND WILLIAM R. TORAK, OFFICE OF SCIENCE AND TECHNOLOGY, SPECTRUM MANAGEMENT DIVISION, FEDERAL COMMUNICATIONS COMMISSION

Mr. SCHAEFER. Thank you, Mr. Chairman.

I am pleased to be here. I am accompanied by Mr. Stephen Lukasik, Chief Scientist of the Commission, and Mr. Bill Torak, who is from our Office of Science Technology, Spectrum Management Division, to perhaps follow up on some of the questions that you may have.

Let me begin by saying that the Commission is pleased with the results achieved at the conference. In our view, the flexibility provided in the table of allocations of the radio regulations constitutes a necessary condition for the growth and prosperity of the telecommunications industry.

The Commission, as you are aware, invested a significant amount of resources to develop, in cooperation with the executive branch, the hundreds of U.S. proposals submitted to the conference. As was mentioned earlier, the 5-year effort involved nine notices of inquiry and a final report and order.

This inquiry process provided for public participation in virtually every aspect of our preparatory effort. Hundreds of persons from the private sector participated in efforts to determine the directions in which our telecommunication industry would evolve over the next 20 years and to identify the spectrum resources needed to support that industry over that same period.

Since the official closing of the conference on December 6, 1979, we have had ample time to reflect on the results achieved. In January 1980, we released the detailed report, which I will submit for the record.[1]

In November 1980 we undertook to ascertain the views of the public on the results of the conference, recognizing that rulemaking would not be appropriate until considerations of the treaty by the Senate. We decided instead to issue a series of notices of inquiry. These notices address the entire table of frequency allocations and various other technical provisions of the revised radio regulations.

As I indicated earlier, the conference incorporated considerable flexibility in the revised international table of frequency allocations. This was a major U.S. objective at the conference and has important positive features. Domestically it permits different radio services to compete for access to the radio spectrum, allowing specific allocations decisions to be based on market needs. It also provides for greater sharing of spectrum among technically compatible radio services.

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[1] See page 10.

The Commission favors ratification of the radio regulations, which provide an international regulatory framework within which the U.S. telecommunications industry can operate, as well as a solid basis for satisfying future domestic requirements as they evolve.

In this regard, it is significant to note that none of the 80 comments filed in our notices of inqury process oppose ratification of the radio regulations. All of the parties interested in telecommunications recognize that issues of concern to them will be addressed in domestic rulemaking actions over the next several years. Final decisions will be made only after full public participation, and proposals which affect the executive branch will undergo full coordination through our normal channels.

In supporting ratification of the radio regulations annexed to the final action, one final observation is germane. The 1979 WARC did not and was not intended to resolve all outstanding international radio matters. Rather, as expected, it proposed a schedule of specialized radio conferences to address special and unique requirements of various services.

Specialized conferences concerned with a particular radio service or a related set of radio services permits the conclusion of detailed agreements not affecting other services. The Commission, with the participation of the public and cooperation with the executive branch is currently engaged in preparations for specialized radio conferences proposed by the 1979 WARC

This concludes my statement, Mr. Chairman, and we would be happy to answer any questions you may have.

[Mr. Schaefer's prepared statement follows:]

PREPARED STATEMENT OF KALMANN SCHAEFER

Good morning Mr. Chairman and members of the Committee. I am pleased to be here today to relate to you the Commission's findings with respect to the Radio Regulations adopted by the 1979 World Administrative Radio Conference which are annexed to its Final Acts. I am accompanied by Dr. Stephen J. Lukasik, Chief Scientist of the Commission, and by Mr. William R. Torak, of the Commission's Office of Science and Technology, Spectrum Management Division.

Let me begin by saying that the Commission is pleased with the results achieved at the Conference. In our view, the flexibility provided in the Table of Allocations of the Radio Regulations constitutes a necessary condition for the growth and prosperity of the U.S. telecommunications industry.

The Commission, as you are aware, invested a significant amount of resources to develop, in cooperation with the Executive Branch, the hundreds of U.S. proposals submitted to the Conference. Our 5-year effort involved nine Notices of Inquiry and a final Report and Order. This inquiry process provided for public participation in virtually every aspect of our preparatory effort.

Additionally, 22 public advisory committees were established along the lines of services, such as the amateur service and the TV broadcast service, for the principal purpose of projecting U.S. requirements for particular radio services through the remainder of this century. Hundreds of persons from the private sector participated in efforts to determine the directions in which our telecommunications industry would evolve over the next 20 years and to identify the spectrum resources needed to support that industry over the same period. Some of the same persons participated in the Conference itself as members of the U.S. delegation and continued to provide expert guidance and suggestions as the Regulations were negotiated. Since the official closing of the Conference on December 6, 1979, we have had ample time to reflect on the results achieved. In January 1980, we released a detailed report, which I will submit for the record, entitled "Results of the 1979 World Administrative Radio Conference." In November 1980, we undertook to ascertain the views of the public on the results of the Conference. Recognizing that rulemaking would not be appropriate until consideration of the treaty by the Senate, we decided instead to issue a series of Notices of Inquiry. These Notices addressed the entire Table of Frequency Allocations and the various other technical provisions of the revised Radio Regulations. Our intent was to compare the Final Acts of the 1979 WARC with the U.S. proposals in order to become aware of concerns in areas where we did not fully achieve our goals and to begin to develop proposals for appropriate modifications to the Commission's Rules and Regulations. While more detailed public participation will be appropriate when we begin to actually implement the Conference results, we believed that the NOI process would not only be of great assistance in our future rulemaking efforts, but would also provide us insight into the basic acceptability of the Conference results to the public.

As I indicated earlier, the Conference incorporated considerable flexibility in the revised international Table of Frequency Allocations. This was a major U.S. objective at the Conference and has important positive features. Domestically, it permits different radio services to compete for access to the radio spectrum, allowing specific allocation decisions to be based on market needs. It also provides for greater sharing of spectrum among technically compatible radio services.

For present purposes, I believe the Committee will be interested in the following specific Conference outcomes and public comments:

(1) The AM broadcasting band was expanded to provide ten additional channels. This expansion will have an impact on the radiolocation (radar) service. Although some concerns were raised by the radiolocation users, they recognized that the new spectrum for broadcasting will not be implemented for several years and that they will be provided adequate time for development of new systems in other frequency bands and for the amortization of existing equipment.

(2) In the High Frequency portion of the spectrum between 3 and 30 MHz, increases in allocations to the broadcasting, maritime-mobile, amateur, and radio astronomy services all received favorable reaction. The U.S. proposals to the 1979 WARC had called for such increases.

(3) In the radio spectrum between 30 and 1215 MHz, the U.S. proposals sought to satisfy expanding short range mobile requirements, while continuing to satisfy broadcasting needs. To accomplish this objective, extensive sharing was proposed by the United States and was for the most part accepted. This area of the spectrum typifies the competition between different radio services: comments were received supporting both mobile and broadcast use of the same spectrum. Our domestic proposal provided for the accommodation of current requirements, recognizing that the international Table of Frequency Allocations provides the needed flexibility to make adjustments in our domestic table if required in the future.

(4) In the spectrum between 1215 MHz and 40 GHz the vast majority of issues dealt with allocation provisions for various space services. The United States sought, and achieved, appropriate allocations for the aeronautical and maritime-satellite, fixed-satellite (including INTELSAT usage), radionavigation-satellite, broadcasting-satellite and inter-satellite services. The main domestic issues involves the extent to which the space services may have an impact on various terrestrial services. Most comments were supportive of the proposals suggested in our Notice of Inquiry dealing with this portion of the spectrum. However, some comments were submitted questioning whether the fixed-satellite service can, in fact, share spectrum with the radiolocation service, particularly at 3 and 5 GHz. The radiolocation service in these bands is currently used by various military systems. Concern was expressed over sharing between the broadcasting-satellite service and the terrestrial fixed service in the 12 GHz band. I must stress that each of these concerns was fully recognized prior to the 1979 WARC and will be addressed in a full and complete Commission proceeding prior to any decisions regarding domestic implementation

(5) Our proposal concerning the spectrum above 40 GHz is essentially reflected in the Table of Frequency Allocations adopted by the Conference. The result is consistent with the U.S. objective of providing for maximum development opportunities and sharing among radio services. Comments received were favorable to this approach.

The Commission favors ratification of the Radio Regulations which provide an international regulatory framework within which the U.S. telecommunications industry can operate, as well as a solid basis for satisfying future domestic requirements as they evolve. In this regard it is significant to note that none of the eighty comments filed in our Notice of Inquiry process opposed ratification of the Radio Regulations.

All of the parties interested in telecommunications recognize that issues of concern to them will be addressed in domestic rulemaking actions over the next several years. Final decisions will be made only after full public participation. Proposals which affect the Executive Branch will undergo full coordination through our normal channels, which include consideration by the Interdepartment Radio Advisory Committee of the National Telecommunications and Information Administration.

In supporting ratification of the Radio Regulations annexed to the Final Acts, one final observation is germane. The 1979 WARC did not, and was not intended to, resolve all outstanding international radio matters. Rather, as expected, it proposed a schedule of specialized radio conferences to address special and unique requirements of various services. (A similar series of specialized conferences followed the 1959 radio conference.) Specialized conferences concerned with a particular radio service or a related set of radio services permit the conclusion of detailed agreements not affecting other services. The Commission, with the participation of the public and in cooperation with the Executive Branch, is currently engaged in preparations for specialized radio conferences proposed by the 1979 WARC.

This concludes my statement and now I would be happy to entertain questions.

[The following report was referred to on page 7.]

STAFF REPORT TO THE COMMISSION ON THE RESULTS OF THE 1979 WORLD ADMINISTRATIVE RADIO CONFERENCE

SUMMARY

The recently completed 1979 WARC should be viewed as substantially a success for the United States. While we did not achieve all of our objectives, and many issues were deferred—either for further study by the sub-organs of the ITU or for consideration by subsequent Conferences—it is clear that the fears of impending disaster expressed by many, prior to the Conference, were not justified. However, with the extensive international activity planned for the ensuing decade, neither the Commission nor the nation can afford to rest on the achievements to date.

BACKGROUND

The 1979 WARC, convened by the ITU, was scheduled pursuant to Resolution 28 adopted by the 1973 Plenipotentiary Conference, Malaga-Torremolinos, to consider necessary changes to the International Radio Regulations. Specific planning including development of the WARC agenda, was conducted by several subsequent meetings of the Administrative Council. Domestic preparations for participation by the United States began in 1974 with the then Office of Telecommunications Policy developing requirements for the Executive Branch, and the FCC for the non-government sector. The Commission over the next four years issued nine Notices of Inquiry (Docket 20271) and, working in close coordination with the Executive Branch, developed a Report and Order, which was adopted in December 1978, and which contained recommended proposals of the United States. Those proposals were then transmitted to the Department of State, which, in turn, forwarded them as amended to the ITU early in 1979 for consideration by the Conference. As preparations for the Conference continued, the U.S. Delegation, with Glen Robinson as the head, was named and included a total of 106, of whom 67 were accredited with 39 in support. Of this total, the Commission provided 23, 18 accredited and five in support. A list of Commission employees who participated is contained in Appendix 1.

REPORT

1. The WARC began on September 24, 1979. Although originally scheduled for 10 weeks, the Conference was extended slightly and concluded with the formal signing of the Final Acts on December 6, 1979. Of the 154 member nations of the ITU, 150 were represented at the Conference by nearly 2000 delegates. The Conference dealt with more than 15,000 individual proposals ranging

from the minor to the vital in terms of world telecommunications. The Final Acts comprise 1100 pages and will be published by the ITU in September, 1980.

2. Of the total number of proposals considered, the United States submitted over 900, each relating to some national, social, economic and/or security need. Nearly all of the U.S. proposals were attained, either in entirety or in substantial part.

3. No immediate changes in the structure or operation of the U.S. telecommunications system will result from Conference decisions. Most changes mandated by the Conference will be phased in over a long period of time and, of course, domestically, the ratification process will need to be completed and Commission Rules and Regulations will need to be amended before the results can be effected.

4. Although initial apprehension existed concerning politicization and bloc-voting at the Conference, very little appeared to materialize, particularly after the first week when the selection of a Chairman became contentious between the advanced and the developing nations. After resolution of that matter with the selection and approval of Mr. Steverini of Argentina as Chairman, and Mr. Kieffer of Switzerland as special Vice Chairman as coordinator of the Technical, Allocation and Regulatory Committees, the Conference generally settled down to matters of a technical nature.

5. There were, of course, several conference issues where the developing countries supported each other in pursuit of what they perceived to be their common interests, but this did not appear to involve ideological bloc-voting independent of national interests. The supported developing countries in many instances, not in others. The same was true of our Conference relations with other industrialized countries. With few exceptions, a good working relationship was developed and maintained between the U.S. and other countries. This relationship should be a good basis for future ITU activity.

6. The United States submitted reservations on a small number of Conference decisions where we felt that decisions taken could adversely affect an important national telecommunications requirement. [A reservation is a formal protocol statement that we will not necessarily be bound by a particular Conference decision.] In each case, the decision was made on the basis of protecting important U.S. interests. It is noteworthy, however, that, of the many thousands of decisions, only a small number were unacceptable to us. (Reference Appendix II).

7. U.S. concerns about the Conference results centered around several factors. One was a tendency to change some important, long-standing allocations without giving adequate recognition to existing operations and investment by other countries (although, by contrast, a majority of countries were insistent on maintaining allocations, particularly for fixed services, where they had existing operations). Another concern was a Conference desire to change regulatory procedures in ways that, in our view, would not be effective. We were also concerned about what seems to be unrealistic expectations of some countries regarding the feasibility of assignment plans for space services and the geostationary orbit.

8. As noted earlier, the Conference dealt with literally thousands of decisions. This report summarizes the major issues, particularly as they impact on the Commission. It has been divided into attachments as follows:

I. Allocations
II. Regulatory
III. Resolutions and Recommendations
IV. Future Conferences

Additional information may be obtained from Kalman Schaefer, telephone (202) 632-7073.

[Attachment I]

ALLOCATIONS

Introduction

The attached outline of allocation actions taken by the WARC is not all-inclusive nor is it so intended. It is primarily an outline of those results which are of concern to the Commission.

It is rather evident that allocation actions, as they affect or will affect the non-government community, were highly favorable and the Commission's expressed desire for flexibility was achieved.

ALLOCATIONS BELOW 27.5 MHZ NON-DIRECTIONAL BEACONS AT MF

The U.S. proposed several new allocations at MF for aeronautical and maritime radionavigation beacons. This is the result of increased requirements by general aviation and carrier arcraft, and small marine craft, to determine the bearing of the vehicle from a fixed point. The FCC, in Docket 78-235, and in coordination with the Executive Branch, has implemented several new bands in anticipation that the WARC would provide the new allocations.

U.S. proposed new bands	Implemented nationally (docket 78-235)	WARC action
190-200 kHz aeronautical radionavigation primary	Yes	Adopted.
275-285 kHz maritime radionavigation secondary	Yes	Not adopted.
325-335 kHz maritime radionavigation secondary	Yes	Adopted.
510-525 kHz aeronautical radionavigation primary	Yes	Do.
510-525 maritime radionavigation secondary	Yes	Not adopted.
525-535 aeronautical radionavigation primary	No (sharing with Traveler's Information Station under study).	Adopted.

Thus, the Commission, in coordination with the Executive Branch, should be able to meet future needs for these types of uses. U.S. national provisions will presumably be continued in order to meet requirements in those two bands where the allocations were not adopted by the WARC.

TRAVELERS INFORMATION STATIONS (TIS)

The U.S. had proposed internationally that the broadcast allocations in the two bands used domestically for TIS (525-535 kHz and 1605-1615 kHz) be limited to public service information and restricted to a maximum transmitter power of 50 watts. The broadcasting allocations were adopted, but the WARC did not agree to the TIS restrictions. While the TIS will be able to continue in the U.S. in the two bands, the Commission will have to decide whether to put normal AM broadcasting operations in the 1605-1615 kHz band, and whether either to share this band with TIS, or have TIS users moved to another segment. At 525-535 kHz, the WARC adopted a power limit for AM Broadcasting stations of 1 kw daytime, 250 watts nighttime, which matches Class IV operation. We will have to decide either to share with TIS, or to move TIS to another band at the appropriate time. Additionally, since the WARC adopted sharing on a co-equal primary basis with broadcasting and the aeronautical radionavigation services at 525-535 kHz, decisions will have to be made, in coordination with the Executive Branch, on the need to satisfy non-directional beacon requirements in this spectrum area. (See Docket 78-235)

AM BROADCASTING

The U.S. proposed additional MF spectrum for broadcasting to permit an expansion of the number of AM broadcasting stations in this country. Our proposal would have provided shared allocations at 1605 to 1800 kHz, and exclusive broadcasting at 1800-1860 kHz. We expected that the total spectrum available for broadcasting under this proposal would have been less than this total because of the need to satisfy other requirements, primarily radio-location, in the same spectrum area. The WARC limited the broadcasting allocation to the 1605-1705 kHz band. The use of this band for broadcasting is subject to a broadcast plan, to be established by a Region 2 Conference which should take place around 1985. Prior to the establishment of such a plan, the band 1605-1705 kHz is allocated to the fixed, mobile and aeronautical radionavigation services on a primary basis, and to the radiolocation service on a secondary basis. After the plan comes into effect, the band 1605-1625 kHz will be exclusively broadcasting, and the band 1625-1705 kHz will be allocated to broadcasting on a primary basis, fixed and mobile on a permitted basis, and radiolocation on a secondary basis. WARC 79 also recommended that the use of the 1625-1665 kHz band for broadcasting should not commence before July 1, 1987, and the use of the 1665-1705 kHz band for broadcasting should not commence before July 1, 1990. This phased-in approach will give administrations in Region 2 that have fixed and mobile operations in the band sufficient time to move these operations into different bands. In implementing broadcasting in this band, the Commission, in coordination with the Executive Branch, will have to decide how to satisfy operations currently existing in the band, including remote pick-up, TIS on 1610 kHz, industrial petroleum, and fixed/fixed coast station operations in Alaska. Additionally, the Commission has over 700 licensees in the radiolocation service in this band, with the Executive Branch also having extensive use. (The radiolocation service in this case is used for oil exploration, surveying and mapping, and related uses). These operations will either have to be moved, or accommodated domestically on a shared basis with the broadcasting service. Such sharing would likely be ineffective near international borders since the radiolocation service is on a secondary basis.

The proposed broadcasting allocations at 1800–1860 kHz were not adopted by the WARC; instead, an exclusive allocation for the amateur service was made at 1800–1850 kHz. The radiolocation service was given a primary shared allocation at 1850–2000 kHz. This allocation will have to be examined to see if lower spectrum requirements can be satisfied in this new higher allocation.

HIGH FREQUENCY BANDS

Because the majority of the countries have continuing and expanding requirements for fixed service frequencies to meet national needs, there were only minor changes to the HF allocations below 14 MHz. An additional 125 kHz was allocated to the broadcasting service at 9 MHz. Two small allocations were made for the maritime mobile service, on a shared co-equal basis with the fixed service, at 4 and 8 MHz. The coast station allotment plan adopted at the 1974 WARC does not at present meet all of the non-government requirements, and these two new allocations, regardless of what actions a future mobile conference might take, will do little to satisfy our needs. Above 10 MHz, several new bands were obtained which should meet future maritime mobile HF requirements. Additional spectrum in five bands was allocated to the broadcasting service, for a total increase of 725 kHz above 10 MHz.

Two new 100 kHz exclusive allocations for the amateur service were obtained at 18 and 24 MHz, and a shared secondary allocation of 50 kHz at 10 MHz. These new allocations should be able to accommodate future amateur growth, and provide suitable bands for use during all propagation periods. At 7 MHz, the existing amateur band in Region 2 was not changed. We had to accept, however, a qualifying note whereby the use of the 7100–7300 kHz amateur band in Region 2 shall not impose constraints on the broadcasting service in Regions 1 and 3.

The allocations for the Aeronautical Mobile (R) service were not changed, except that a new exclusive allocation at 21 MHz was obtained. Thus, implementation of the 1978 Aeronautical (R) WARC will be able to continue.

In adopting the revised allocations in the HF bands, an extensive recommendation procedure was agreed. This procedure has several steps and takes place over a long period of time. The first step starts in January–April 1980, when the IFRB will send to each administration a list of all HF assignments shown in the International Frequency List (IFL) in the bands allocated to the fixed service on an exclusive or shared basis. Administrations then have until March 1981 to review each entry and take action to:

(a) Delete entries no longer needed;

(b) Classify remaining entries as either for regular operational use, standby use, or occasional use on a reserve basis; and

(c) Indicate the hours of operation of the frequency.

This initial procedure will have to be preceded by national policy decisions insofar as use of the HF fixed spectrum is concerned. FCC has many listings in the ILF for long haul point-to-point common carrier systems that are now no longer being used, having been replaced by either satellite or trans-ocean cable systems. Thus, decisions will have to be made insofar as retention of these listings to provide for future national flexibility. Government listings will have to be considered at the same time.

Beginning in July 1984, and for a five-year period for bands above 10 MHz, and for a 10-year period for bands below 10 MHz, administrations are required to replace their assignments in those previous fixed service bands allocated to another service by the 1979 WARC. This again will require detailed examination, and will have to be based on national policy decisions made by the FCC in coordination with the Executive Branch.

27.5–960 MHZ

The non-government issues of principal interest in this range of spectrum are shared UHF broadcasting and mobile allocations, frequency allocations for short range maritime communications, and short range aeronautical communications.

Conference actions generally strengthened future decision options the Commission may take with respect to the introduction of fixed and mobile services in bands between 470 and 960 MHz while preserving broadcasting allocations between 470–890 MHz.

MARITIME SHORT RANGE ALLOCATIONS

The U.S. proposal for a worldwide maritime allocation at 216–225 MHz was not accepted because of extensive broadcasting uses in other parts of the world. However, a new Region 2 maritime allocaton at 216–220 MHz and mobile allocation 220–225 MHz provides necessary allocations should the Commission decide to implement a river system or other maritime uses in this frequency range. In recognition of the worldwide maritime need, the Conference approved a recommendation which provides for a future Mobile Conference which could identify spectrum for a worldwide short range maritime communications system. The Commission must be prepared to identify the amount of spectrum and the preferred band in time for that Conference.

The Commission should also be aware that footnote 287[1] came under strong attack at the Conference. This can be expected to continue in the future until worldwide acceptance of an alternative band for maritime communications is achieved.

AERONAUTICAL SHORT RANGE ALLOCATIONS

The U.S. proposal at 136–137 was accepted on a worldwide basis with implementation after 1990. Orderly transition to this additional spectrum should be achieved through close domestic coordination.

900 MHZ–40 GHZ

L-band (1530–1660.5 MHz)

The significant impact of the decisions reached in this part of the spectrum concern the doubling of spectrum available to the Maritime Mobile Satellite Service, while retaining the existing frequency separation between the up and down links. This will allow for future expansion of the maritime satellite service with a minimal economic impact on individual ship station licensees. The one negative aspect of the reallocation decision is a reduction by 5 MHz of the frequency band used for aeronautical mobile telemetry operations. It is not felt that this will place an unduly severe constraint on the mobile telemetry operations.

Amateur-satellite

A number of new bands were identified at the WARC to accommodate amateur satellite operations. All of the new bands identified below 40 GHz were in bands already allocated to the terrestrial amateur service. There is no adverse impact expected from these allocation decisions.

2.5 GHz band

Consonant with the U.S. proposals to the Conference, the 2.5 GHz band was substantially open up to the fixed-satellite service, so that it now shared the band co-equally with the broadcasting-satellite service at the same power flux density levels. This now opens the way in a completely unambiguous manner for the introduction of user-oriented systems to be developed.

12 GHz

The WARC decisions at 12 GHz meet nearly all the U.S. objectives. These objectives were:

(a) the elimination of arc segmentation, which enables the entire geostationary orbit to be utilized by both the fixed-satellite service and the broadcasting-satellite service:

(b) the elimination of the possibility of planning the fixed-satellite service at the 1983 Region 2 Conference; and

(c) the maintaining of the viability of direct to the home satellite broadcasting for the United States.

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[1] Footnote 287 provides an option for countries to use for other purposes frequencies in the 156–161 MHz band which are allocated internationally for maritime mobile. In the United States, many of the frequencies are used for land mobile (particularly railroad) purposes.

Unfortunately, the WARC could not reach a final decision on the entire 11.7–12.7 GHz band; some aspects were left for final resolution by the 1983 Region 2 Broadcasting-Satellite Planning Conference. One of these aspects was the final division of the 12.1–12.3 GHz band between the fixed-satellite and broadcasting-satellite services. The 1983 Conference will divide this sub-band between these two space services. While the U.S. hopes the division will be at 12.2 GHz, this is not, of course, a guaranteed outcome. The Commission will have to assess this situation with respect to any fixed- or broadcasting-satellite stations it may authorize to operate in this sub-band between now and the convening of the 1983 Conference.

BSS uplinks

For Region 2, the WARC specifically allocated the 14.5–14.8 GHz and 17.3–18.1 GHz bands to the FSS exclusively for uplinks to broadcasting-satellites. Of course, any other Fixed Satellite (Earth-to-space) bands can be used for this purpose. At the Conference, the band 17.3–18.1 GHz was clearly identified as the preferred BSS uplink band for Region 2. This band will also be the subject of detailed planning at the 1983 Region 2 Conference. This band is 800 MHz wide, and only approximately 500 MHz is required to satisfy the Region 2 requirement.

3 and 4 GHz fixed-satellite downlinks

The U.S. proposal for an expansion of FSS spectrum at 2 GHz to meet spectrum requirements of international systems, particularly INTELSAT, was not accepted. However, the bands 3400–3700 MHz and 4500–4800 MHz were specifically identified for this purpose by the Conference. The former band is an existing allocation, the latter is new. The United States, at the Conference, agreed to the acceptance of these two bands for international satellite systems; however, there were caveats expressed. These are embodied principally in two ways: the first is in a footnote to the allocations table in the 3400–3600 MHz band which in effect states that the Radiolocation Service and the Fixed-Satellite Service are on a co-equal basis in Regions 2 and 3 until such time as the Radiolocation Service can be reaccommodated; the second is in the form of a "Declaration" signed by a number of developed countries (see Appendix III). The Declaration maintains the options of the U.S. to participate fully through the U.S. signatory in the normal INTELSAT process of implementing new fixed-satellite service facilities. The sharing issues and considerations are complex and will require detailed examination.

14 GHz mobile-satellite service

An allocation was provided by the WARC for the operation of the mobile-satellite service on a secondary basis in the 14.0–14.5 GHz band. This proposal was supported by the U.S. as a means of accommodating mobile earth stations which might be used by television networks, or others, engaged in on-the-spot news or sports coverage, as a means of providing real-time coverage of these events on a global basis.

40 GHz mobile-satellite service

The U.S. proposals to WARC attempted to provide for this service around 40 GHz; but our proposals kept the entire allocation above 40 GHz. The WARC adopted an allocation for the Mobile-Satellite Service from 39.5–40.5 GHz. This is an important requirement for some government users. It will be necessary during domestic implementation of this band to consider the overall U.S. national interest in this area.

[Attachment II]

REGULATORY MATTERS

Objective

The U.S. objective regarding the Articles in the Radio Regulations concerning the advance publication, coordination, notification and registration of frequency assignments to space and terrestrial services was to maintain these provisions essentially unchanged, as they have proven to be adequate over the years. This view was shared by a substantial number of administrations.

Major actions taken

The provisions dealing with the advance publication, coordination, notification and registration of space radiocommunication services underwent only minor changes. Specifically, these changes involved (1) the lengthening of the time periods in which administrations are to examine the advance publication information on new space radiocommunication networks and the requests for coordination between networks or between earth stations and terrestrial stations, (2) the requirement to submit additional reports to the IFRB, for publication, on the progress in resolving problems in the advance publication and coordination stages of implementing a space radiocommunications network, and (3) clarification of various provisions to reflect current practices in the Regulations.

The provisions dealing with the coordination and notification of terrestrial stations in bands shared with the space services underwent similar changes.

A new Article was adopted introducing a procedure to be followed when a footnote to the Table of Frequency Allocations requires the agreement, before operating stations under the footnote, of another administration whose services may be affected.

The provisions dealing with the notification and registration of terrestrial services underwent revision although the concept remains basically unchanged. Many of the existing provisions were revised to clarify and highlight them. These included(1) that the IFRB select frequency assignments of countries in need of special assistance, (2) that the IFRB assist in the identification of the source of interference to stations of countries in need of special assistance, and (3) that the IFRB review Master Register entries which received unfavorable findings with a view to upgrading these entries when the assignments have not caused harmful interference. The provisions which require the IFRB to select a frequency for an HF station in the fixed service for a country also call for existing entries to be modified if that will permit the accommodation of a new assignment. In order to assist the IFRB and administrations in selecting assignments for stations in the fixed service in the HF bands, the assignments will be required to be classified as to their operational status and more precise hours of operation be furnished. The other modification was to revise the "insistence procedure" whereby an assignment which receives an unfavorable finding due to the probability of interference to an existing assignment is resubmitted to the IFRB stating that no reports of harmful interference have been made. The new provisions call for the IFRB to publish the resubmitted assignment and to notify the administrations that may be affected. The administrations are then to report to the IFRB if interference is caused to their assignments during a two-month period. IFRB action at the end of the period will be determined by the reports, if any, that are received.

To maintain the accuracy of the Master Register, provisions were adopted whereby the IFRB is to conduct periodic review of each section by sending to each administration extracts of their entries for review and necessary revision.

A special procedure dealing with the removal of unused assignments from the Master Register, classification of assignments, and the reaccommodation of displaced assignments was adopted for the HF bands presently allocated to the fixed service. Some actions will have to be taken prior to the effective date of the Final Acts.

The related Appendices by which frequency assignment data are submitted for coordination and notification purposes were also revised. The major change was the requirement for more information on terrestrial stations. Although not considered a regulatory matter, the adoption of the new method of designating emissions will affect the preparation of notices.

The provisions which require the submission of data for inclusion in the various specialized lists of the ITU such as the List of Coast Stations were not changed.

Impact

Basically, in the past, the Commission in general has afforded to the regulatory aspects of the Radio Regulations the lowest priority. Consequently, we have neither the manpower nor the data required to comply fully with the existing or revised provisions. The requirements for both actions to be taken and information to be supplied have been increased by the results of the 1979 WARC. For example, beginning this month, all assignments in the HF bands presently allocated to the fixed service must be classified as to their operational status or deleted. To perform this task, the Commission's resources will be strained even with the licensees' fullest cooperation. In 1982, when the Final Acts are scheduled to come into force, the Commission must have in place for the first time since at least 1959, the necessary data for compliance with the Radio Regulations. In order to accomplish this, action must be undertaken and completed so as to revise every application form and automated file. The necessary data must be collected and available so as to allow the Commission the option to notify or not where the international Radio Regulations afford us that option. Lacking that data, we will have no choice, and U.S. interests can only suffer as a result. It is important that the Commission collect and make available for notification purposes the needed information.

In the past, the Commission's effort to meet the requirements of submission of data for inclusion in the specialized lists of the ITU has been largely a manual effort. Fully automated inputs to the preparation of the service documents involved may be necessary prior to the coming into force of the Final Acts.

Provided that the necessary data are collected and are automated in such a manner as to be fully supportive of our international treaty obligations, there would appear to be no immediate need for additional personnel.

There are a number of other subjects in the Regulatory area which are either of interest to the Commission presently or will have an impact on Commission decisions in the next decade or so. These items are listed by subject.

Secrecy.—An editorial change to the international secrecy provisions, taken together with the floor debate leading to that change, brings the meaning of the ITU Regulations closer to the language of the U.S. statute (47 U.S.C. 605). Also, if there is a desire to pursue a further change to the international secrecy provisions, the door is open to permit the U.S. to raise the issue at the next Plenipotentiary Conference in 1982. Article 22 of the ITU Convention (Malaga-Torremolinos, 1973) provides the legal basis for preservation of telecommunications secrecy.

No-code amateur.—U.S. proposal for a no-code amateur service was strongly opposed and failed. However, the frequency limit, above which code-tests need not be given, was lowered from 144 MHz to 30 MHz. This would allow for a no-code amateur service at frequencies not normally subject to "skip" propagation. A no-code amateur service below 30 MHz is not possible under the regulations.

International monitoring.—The role of the international monitoring service was increased at the WARC in three key areas:

(a) To assist the ITU in "clearing" frequencies for new users.

(b) In achieving increased technical tolerances and eliminating interference among shared services.

(c) In controlling interference and establishing sharing criteria among users of the geostationary orbit.

Recommendation D, International Monitoring, was increased in scope to cover all frequencies in the spectrum as well as modified to encourage assisting the IFRB in determining which entries of the master frequency register may be deleted in reaccommodating Fixed Services so that additional broadcasting frequencies can be made available.

Recommendation XH relating to practical needs of developing countries recommends that administrations make special efforts to furnish monitoring information and other technical assistance that would aid in obtaining proper frequency assignments (interference free or interference minimized).

Radio astronomy.—An article on the Radio Astronomy Service was written and included within the 1979 Final Acts, providing the framework for interference-free radio astronomical observations.

Recommendation YU relating to the use of the frequency bands 1400–1727 MHz 101–120 GHz and 197–220 GHz for search for intentional emissions of extraterrestrial origin, was adopted to promote a controlled frequency environment suitable for observations in these bands.

Recommendation YY relates specifically to the important band 1330–1400 MHz and provision of increased protection for radio astronomy observations against man-made interference.

Automatic identification.—Identification of radio stations by automatic means was encouraged by adoption of the U.S. proposals. Automatic identification in practical cases, for appropriate services, can lead to faster resolution of interference problems and to improved management of the radio frequency spectrum. This means of identification would have possible application, for example, in some of the land mobile services. It would have little application, if any, in the broadcasting services. The article dealing with identification of stations reflects this modified non-mandatory language. The Commission would have to adopt specific rulemaking, if so desired, to actually implement automatic identification procedures.

Recommendation XN, relating to Automatic Identification of Stations, suggests that the CCIR develop a standard method for use. No standard now exists.

Technical assistance to developing countries.—There was a clear message from developing countries that there must be additional consideration given to the Third World in telecommunication areas in order to enable them to cooperate in worldwide frequency management. The U.S., as a leading industrialized nation, should examine carefully the following Resolutions and Recommendations.

Resolution DG, relating to the transfer of technology, urges Administrations of developing countries to establish policies to strengthen international cooperation activities which will achieve transfer of telecommunication technology, and particularly to participate in the CCIR and the CCITT to that end.

Resolution CZ, relating to international cooperation and technical assistance in the field of space radiocommunication, is aimed at making available any means of technical assistance in the space communications area.

Resolution CY is related to promoting telecommunications in rural development of education, health, agriculture, and other activities important for economic and social progress.

Resolution CG relates to technical cooperation with developing countries in the study of propagation in tropical areas.

Resolution CF relates to study of lightning protection of radio equipment in areas of the world with unusual discharge phenomena. This lightning protection resolution comes from tropical countries which have not had success in dealing with the problem with the limited resources available to them for practical study.

Resolution CE relates to technical cooperation with developing countries in the maritime communications area with a view to providing experts on temporary duty, to providing lecturers, giving technical advice as requested, or by receiving students under ITU fellowships.

Resolution BZ relates to improvements in assistance to developing countries in securing access to HF bands for Fixed Services and in ensuring protection against harmful interference by suggesting developed countries make minimum use of IFRB resources, thereby allowing developing countries to capitalize on IFRB assistance to the maximum extent possible.

Resolution AD relates to assistance needed by developing countries to establish or strengthen their national radio frequency management procedures.

Recommendation ZP relates to developing specifications of low-cost television receivers that would help economies of developing nations while providing the many advantages of television.

Recommendation E relating to studies and prediction of radio propagation and radio noise in parts of the world where never conducted.

Classification of emissions.—WARC 79 adopted the CCIR studies and recommended new method of classifying and designating emissions. The new method provides for a more precise and descriptive way of specifying transmissions. This new procedure is fully supported by Commission staff as allowing more efficient use of the spectrum by improving international frequency registration techniques and allowing more accurate determination of interference potential when planning new systems in shared frequency bands.

Part 2 of the FCC Rules will have to be amended to reflect the internationally recognized new method and then eventually, all of the Commission Rules will need editorializing to replace existing emission notations by those under the new system. For an indeterminate time, both the old and new methods should appear in Part 2 to avoid confusion and ease the transition.

Under Resolution AK, the IFRB will prepare and publish explanatory information within the next 10 months to help implement the new method. Conversion of the master frequency register to the new designation system could begin soon, depending on when administrations begin forwarding necessary data.

Spurious emissions.—In accordance with U.S. proposals, spurious emission limits for transmitters were adopted in Appendix 4 up to 17.7 GHz. This increases the previous international upper frequency bound from 235 MHz, except in special cases of stations in the space services and systems using digital modulation techniques which require additional study. Recommendation L to the CCIR requests these studies as a matter of urgency. FCC rules will eventually have to be amended, where necessary, to reflect the internationally agreed spurious emission limits. The increased frequency range is not effective until 1994.

There were no essential changes below 235 MHz requiring specific Commission action.

Frequency tolerances.—Values of frequency tolerance recommended by the SPM were essentially adopted at WARC. A few tolerance values were loosened internationally. In one case, a frequency tolerance tighter than what the SPM recommended, was adopted by strong developing country move, which apparently will affect FCC licensed transmitters in the Land Mobile Services operating with 2 watts or less (generally walkie-talkies).

WARC 79 adopted by footnote a frequency tolerence of 15 ppm in the band 235–470 MHz for portable equipment having mean output power of 5 watts or less. This tolerance value is to have effect for all new transmitters after January 1, 1985, and to all 5 watt or less transmitters after January 1, 1990.

Present FCC tolerance for some land moblie service walkie-talkies in the band 235–450 MHz is specified at 0.005 per cent or only 50 ppm. The 50 ppm value appears unrealistic with channeling schemes that exist in this region. The FCC was committed, by endorsement of the SPM values, to a tolerance of 20 ppm by some future date, recognizing the present limit was inadeqate for appropriate spectrum management in the future.

Effective date.—The Final Acts of the 1979 WARC will enter into force as of January 1, 1982. There are many individual, effective dates for specific provisions of the Fnal Acts. The Two Stage Frequency Tolerance Values of Appendix 3, mentioned before, come into force in 1985, and at January 1994. Many footnote provisions to the Table of Frequency Allocations, where change is needed, do not become effective until certain dates are reached, depending on circumstances. Because the present system of call sign formulation is exhausted for some nations, the Identification of Stations Article with its related Call Sign Table Appendices, having many times more possibilities for call sign construction than now, becomes effective on January 1, 1981.

The Final Acts incorporates the various effective dates of results of other conferences, either adopting them, or abrogating them, as needed, to make the 1979 Final Acts a cohesive, noncontradictory set of international Radio Regulations.

[Attachment III]

RESOLUTIONS AND RECOMMENDATIONS

A total of 87 Resolutions and 90 Recommendations was adopted by the 1979 WARC. Many of the resolutions referred study topics to CCIR and proposed the convening of world or regional administrative radio conferences. These are covered later.

Beyond those two categories, the developing countries introduced several resolutions seeking increased assistance in the following areas:

(a) Technical cooperation in maritime telecommunications, especially by providing technical advice and by assisting in training the Third World countries' staffs;

(b) Technical cooperation in national propagation studies in tropical areas designed to improve and develop the developing countries' radiocommunications;

(c) Development of national radio frequency management within the developing countries through such means as regional seminars and training;

(d) Transfer of technology in telecommunications for the purpose of developing services and attaining social, economic and cultural objectives of the developing countries; and

(e) Use or role of telecommunications in rural development.

These resolutions look to the United Nations Development Center as the primary source of funding. However, the U.S. will be expected to participate directly or indirectly in the areas described.

1979 WARC RESOLUTIONS FOR CCIR STUDIES

Resolution AA.—Relating to a Procedure for Resolving a Disagreement over the Technical Standards or Rules of Procedure of the International Frequency Registration Board.

Resolution AE.—Relating to the Division of the World into Regions for the Purposes of Allocating Frequency Bands.

Resolution AG.—Relating to the Protection of Radiocommunication Services against Interference Caused by Radiation from Industrial, Scientific and Medical (ISM) Equipment.

Resolution AJ.—Relating to Information on the Propagation of Radio Waves Used in the Determination of the Coordination Area.

Resolution AN.—Relating to the Use of Class R3E and J3E Emissions for Distress and Safety Purposes on the Carrier Frequency 2 182 kHz.

Resolution BK.—Relating to the Division of the World into Climatic Zones for the Purpose of Calculation of Propagation Parameters.

Resolution BM.—Relating to the Convening of a Planning Conference for Sound Broadcasting in the Band 87.5–108 MHz for Region 1 and Certain Countries Concerned in Region 3.

Resolution BP.—Relating to the Use of the Geostationary-Satellite Orbit and to the Planning of Space Services Utilizing it.

Resolution BQ.—Concerning the Drawing up of Agreements and of the Associated Plans for Feeder Links to Broadcasting-Satellites operating in the 12 GHz Band under the Plan Adopted by the World Broadcasting-Satellite Administrative Radio Conference (Geneva, 1977) for Regions 1 and 3.

Resolution CH.—Relating to the Convening of a Regional Administrative Radio Conference for the Detailed Planning of the Broadcasting-Satellite Service in the 12 GHz Band and Associated Feeder Links in Region 2.

Resolution CI.—Relating to the Application of Certain Provisions of the Final Acts of the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977 to take into Account Changes made by the 1979 World Administrative Radio Conference to the Table of Frequency Allocations for Region 2 in the Band 11.7–12.7 GHz.

Resolution CJ.—Relating to the Sharing between the Fixed-Satellite Service in Regions 1 and 3 and the Broadcasting-Satellite Service in Region 2 in the Band 12.2–12.7 GHz.

Resolution CL.—Relating to the Establishment of the Broadcasting-Satellite Service in Region 3 in the 12.5–12.75 GHz Frequency Band and to Sharing with Space and Terrestrial Services in Regions 1, 2 and 3.

Resolution CM.—Relating to the Broadcasting-Satellite Service (Sound) in the Frequency Range 0.5 GHz to 2 GHz.

Resolution CN.—Relating to Frequency Provisions for Development and Future Implementation of Ship Movement Telemetry, Telecommand and Data Exchange Systems.

Resolution CQ.—Relating to the Convening of a Regional Broadcasting Conference to Review and Revise the Provisions of the Final Acts of African VHF/UHF Broadcasting Conference (Geneva, 1963).

Resolution CW.—Relating to the Calculation Methods and Interference Criteria Recommended by the CCIR for Sharing Frequency Bands between Space Radiocommunication and Terrestrial Radiocommunication Services or between Space Radiocommunication Services.

Resolution DB.—Relating to the Introduction of a Digital Selective Calling System to Meet the Requirements of the Maritime Mobile Service.

Resolution DI.—Relating to the Convening of a World Administrative Radio Conference for the Planning of the HF Bands Allocated to the Broadcasting Service.

Resolution DK.—Relating to the Convening of a Regional Administrative Radio Conference to Establish Criteria for the Shared Use of the VHF and UHF Bands Allocated to Fixed, Broadcasting and Mobile Services in Region 3.

1979 WARC RECOMMENDATIONS FOR CCIR STUDIES

Recommendation D.—Relating to International Monitoring.

Recommendation I.—Relating to Studies for the Introduction of Single-Sideband (SSB) Techniques in the HF Bands Allocated to the Broadcasting Service, in Preparation for the World Administrative Radio Conference on HF Broadcasting.

Recommendation H.—Relating to the Preparation of the Technical Information Necessary for the World Administrative Radio Conference on HF Broadcasting.

Recommendation K.—Supplementing the Additional Characteristics for Classifying Emissions and Providing Additional Examples for the Full Designation of Emissions, Both as Given in Appendix 5.

Recommendation L.—Relating to Studies of the Maximum Permitted Levels of Spurious Emissions.

Recommendation M.—Relating to the Provision of Formulae and Examples for the Calculation of Necessary Bandwidths.

Recommendation N.—Relating to the Use of Airborne Radars in the Frequency Bands Shared Between the Inter-Satellite Service and the Radiolocation Service.

Recommendation O.—Relating to Sharing Frequency Bands between the Aeronautical Mobile Service and the Inter-Satellite Service.

Recommendation P.—Relating to the Frequency Tolerances of Transmitters.

Recommendation Q.—Relating to the Technical Standards of the IFRB.

Recommendation R.—Relating to Protection Ratios and Minimum Field Strengths Required.

Recommendation S.—Relating to Studies of the Technical Characteristics of Equipment.

Recommendation T.—Relating to the Criteria to be applied for Frequency Sharing between the Broadcasting-Satellite Service and the Terrestrial Broadcasting Service in the Band 620–790 MHz.

Recommendation V.—Relating to the Development of Techniques which would help to Reduce Congestion in the High Frequency Bands Allocated to the Aeronautical Mobile (R) Service.

Recommendation X.—Relating to the Study of Modulation Methods for Radio-Relay Systems in Relation to Sharing with Fixed-Satellite Service Systems.

Recommendation Y.—Relating to a Study of the Utilization of the Aeronautical Mobile-Satellite (R) Service.

Recommendation Z.—Relating to the Coordination of Earth Stations.

Recommendation ZB.—Relating to Technical Standards for the Assessment of Harmful Interference in the Frequency Bands above 28 MHz.

Recommendation ZD.—Relating to Transmitting Antennae for the Broadcasting-Satellite Service.

Recommendation ZE.—Relating to Feeder Links for the Broadcasting-Satellite Service.

Recommendation ZF.—Relating to Spurious Emissions in the Broadcasting-Satellite Service.

Recommendation ZM.—Relating to the Technology for New Spectrum Sharing and Band Utilization Schemes.

Recommendation ZL.—Relating to Studies of Propagation at 12 GHz for the Broadcasting-Satellite Service.

Recommendation ZQ.—Relating to Frequency Bands Shared between Space Radiocommunication Services and between Space and Terrestrial Radiocommunication Services.

Recommendation ZR.—Relating to Terminology.

Recommendation ZV.—Relating to Compatibility between the Broadcasting Service in the Band 100–108 MHz and the Aeronautical Radionavigation Service in the Band 108–117.975 MHz.

Recommendation ZY.—Relating to an Automated UHF Maritime Mobile Radiocommunication System.

Recommendation YC.—Relating to the Preparation of a Broadcasting Plan in the Band 1 605–1 705 kHz in Region 2.

Recommendation YD.—Relating to Planning the Use of Frequencies by the Maritime Mobile Service in the Band 435–526.5 kHz in Region 1.

Recommendation YE.—Relating to Planning for the Use of Frequencies in the Bands between 1 606.5 and 3 400 kHz Allocated to the Maritime Mobile Service in Region 1.

Recommendation YG.—Relating to a Handbook for Computer-aided Techniques in Radio Frequency Management.

Recommendation YH.—Relating to the Definitions of "Service Area" and "Coverage Area".

Recommendation YL.—On the Choice of a Frequency in the Mobile Maritime Bands between 1 605 and 3 800 kHz to be Reserved for Safety Requirements.

Recommendation YM.—Relating to the Improved Use of the HF Radiotelephone Channels for Coast Stations in the Bands-allocated exclusively to the Maritime Mobile Service.

Recommendation YS.—Relating to Distress, Urgency and Safety Traffic.

Recommendation YT.—Relating to Studies of the Interconnection of Maritime Mobile Radiocommunication Systems with the International Telephone and Telegraph Networks.

Recommendation YV.—Relating to the Use of the Frequency Band 32–33 GHz Shared Between the Inter-Satellite Service and the Radionavigation Service.

Recommendation YW.—Relating to Frequency Sharing by the Earth Exploration-Satellite Service (Passive Sensors) and the Space Research Service (Passive

Sensors) with the Fixed, Mobile (except Aeronautical Mobile) and Fixed-Satellite Services in the Band 18.6–18.8 GHz.

***Recommendation YX.*—Relating to Preferred Frequency Bands for Systems using Tropospheric Scatter.**

***Recommendation YZ.*—Relating to the Use of the Frequency Band 9 300–9 500 MHz 2.**

***Recommendation XA.*—Relating to Technical Characteristics and Frequencies for Shipborne Transponders 2.**

***Recommendation XD.*—Relating to Maritime Radiobeacons.**

***Recommendation XE.*—Relating to the Use of Space Radiocommunication Systems in the Event of Natural Disasters, Epidemics, Famines and Similar Emergencies.**

***Recommendation XI*—Relating to the Future Use and Characteristics of Emergency Position-Indicating Radiobeacons.**

***Recommendation XN.*—Relating to Automatic Identification of Stations.**

***Recommendation XO.*—Relating to the Transmission of Electric Power by Radio Frequencies from a Spacecraft.**

[Attachment IV]

FUTURE CONFERENCES

About two dozen specialized world or regional administrative radio conferences were proposed at WARC 79. The Conference recommended that three world conferences and seven regional conferences be held. Specific dates or agendas were not established. This is a function of the ITU Administrative Council, as are decisions in terms or budget and other resource constraints.

The recommended conferences and the approximate projected dates are as follows:

A—World Administrative Radio Conference for Mobile Services—1983. This conference would consider allocation and other matters affecting the Aeronautical, Maritime, and Land Mobile services including integrated types of operation as were proposed by several countries at the WARC 79. It is logical that follow-on, single service conferences would need to be held subsequently although these were not discussed.

B—Regional Administrative Radio Conference for the detailed planning of the Broadcasting Satellite Service in the 12 GHz band and associated uplinks in Region 2. This Conference stems from the 1977 Broadcasting Conference which planned the 12 GHz band in Regions 1 and 3 and is scheduled for the second quarter of 1983.

C—Regional Administrative Radio Conference for planning Sound Broadcasting in the band 87.5–108 MHz in Region 1 and certain countries in Region 3. This Conference, except peripherally, will not affect the United States. Again, two sessions are planned with the first session being held in the third quarter 1983 and the second session approximately 18 months thereafter.

D—Regional Administrative Radio Conference for planning uplinks to broadcasting satellites operating in the 12 GHz band in Regions 1 and 3. This is the follow-on to the 1977 Broadcasting-Satellite WARC and is the counterpart to B above. It is tentatively to be in the late 1983 time frame. Except for inter-regional sharing, U.S. is not involved.

E—Regional (European Maritime Area) Conference to revise the 1951 Paris Arrangement. This plan deals with the MF maritime radio beacons and is of some interest to the U.S. Recommended tentatively for second quarter, 1984.

F—Regional Administrative Radio Conference to prepare a plan for the initiation of broadcasting services in the band 1605–1705 kHz in Region 2. This Regional MF Conference will consider the additional band allocated at 1605–1705 kHz to broadcasting by the 1979 WARC. It was tentatively recommended for the second quarter, 1985.

G—World Administrative Radio Conference for the planning of the HF bands allocated to the broadcasting services. While two sessions are expected in order to consider and develop a plan for international broadcasting, the specific time frame was not established other than "as soon as possible after the next CCIR Plenary." Since the next Plenary would be in 1982, a time frame of 1984–85 can be expected.

H—World Administrative Radio Conference on the Geostationary Orbit and the planning of space services. Although the terms of reference are indefinite, the

intent is to develop plans to insure equitable access by all countries to the geostationary orbit and appropriate frequency bands. Two sessions are expected with the first to take place about 1984 and the second, 18 months later.

I—Regional Administrative Radio Conference to establish criteria for shared use of the VHF and UHF bands allocated to fixed, broadcasting and mobile services in Region 3. No specific time frame was projected, although again, two sessions are anticipated.

J—Regional Administrative Radio Conference to revise the TV Broadcasting VHF/UHF plan (Geneva 1963) for the African Broadcasting Region. 1984 was given as the preferable date.

In addition to the above Conferences, the ITU schedules an Administrative Council meeting annually (in the May/June time frame) and Plenipotentiary Conferences periodically to revise the Convention. The next Plenipotentiary is scheduled for Nairobi in the fall of 1982. Furthermore, CCIR Plenary sessions are held every four years, with interim and final meetings held in the intervening period. These CCIR meetings will consider, among others, the relevant Resolutions and Recommendations of WARC 79.

The projected schedule of international meetings over the next decade is extensive. Each of these conferences will require detailed U.S. preparation, and will necessitate adequate resources to ensure that U.S. telecommunication interests are protected.

[Appendix I]

U.S. WARC DELEGATION—FCC PORTION

Charles H. Breig, Broadcast Bureau, Room 322, 1919 M.
Paul E. Carroll, Office of Science and Technology, Room 7212, 2025 M.
Robert L. Cutts, Office of Science and Technology, Room 7218, 2025 M.
Satyendranath Das, Office of Science and Technology Room 7218, 2025 M.
John T. Gilsenan, Private Radio Bureau, Room 5114, 2025 M.
Wendell R. Harris, Common Carrier Bureau, Room 546, 1919 M.
Edward R. Jacobs, Office of Science and Technology, Room 7218, 2025 M.
Ronald Lepkowski, Common Carrier Bureau, Room 538, 1919 M.
S. J. Lukasik Office of Science and Technology, Room 7002, 2025 M.
William A. Luther, Field Operations Bureau, Room 738, 1919 M.
James C. McKinney, Field Operations Bureau, Room 734, 1919 M.
Neal K. McNaughten, Broadcast Bureau, Room 314, 1919 M.
Lawrence M. Palmer, Office of Science and Technology, Room 7218, 2025 M.
Kalmann Schaefer, Office of Plans and Policy, Room 832, 1919 M.
William R. Torak, Office of Science and Technology, Room 7218, 2025 M.
Thomas S. Tycz, Office of Science and Technology, Room 7218, 2025 M.
Arlan K. van Doorn, Private Radio Bureau, Room 5002, 2025 M.
Francis K. Williams, Office of Science and Technology, Room 7208, 2025 M.

U.S. WARC DELEGATION—FCC PORTION OF SUPPORT STAFF

Joanne Collins, Office of Plans and Policy, Room 832, 1919 M.
Barbara B. Cutts, Office of Science and Technology, Room 7218, 2025 M.
Roger Herbstritt, Office of Science and Technology, Room 7128–B, 2025 M.
Lawrence Petak, Office of Science and Technology, Room 7218, 2025 M.
Anthony M. Rutkowski, Office of Plans and Policy, Room 832, 1919 M.

[Appendix II]

FINAL PROTOCOL STATEMENTS

No. 32

For the Federal Republic of Germany, Belgium, Denmark, the United States of America, Greece, Iceland, Italy, Luxembourg, Norway, the Kingdom of the Netherlands, Portugal, the United Kingdom of Great Britain and Northern Ireland, Turkey:

The above-mentioned administrations reserve their right to operate systems in the mobile-satellite service in the frequency range 235–399.9 MHz under the provisions of the relevant footnote to the Table of Frequency Allocations, subject only to cooridnation as prescribed in Article N13A. The additional provision of this footnote imposes a condition of non-interference which could lead to a request to cease operation of a previously coordinated satellite system in the case where an administration, despite having agreed to such a satellite system, puts into service or merely plans a system that might receive harmful interference. Such a condition is unacceptable to the above administrations.

No. 36

For the Kingdom of Saudi Arabia, the Republic of Cyprus, Spain, the United States of America, Greece, the United Kingdom of Great Britain and Northern Ireland, the Democratic Socialist Republic of Sri Lanka, the Republic of Zambia:

In the view of the above-mentioned administrations this Conference has failed to make adequate provision for the needs of the HF broadcasting service in the revised allocations, particularly at 6 and 7 MHz. Unless authority is given to the proposed HF Broadcasting Conference, by its agenda, for it to make use of some parts of the spectrum allocated to the fixed service, that Conference will not be able to plan all frequency bands to enable countries to sustain their broadcasting services in the face of varying propagation conditions throughout the solar cycle. In the absence of an adequate plan, the above-mentioned administrations reserve their right to take the necessary steps to meet the needs of their HF broadcasting services.

No. 38

For the United States of America:

The delegation of the United States of America formally declares that the United States of America does not, by signature of these Final Acts on its behalf, accept certain decisions taken by this Conference in regard to the Table of Frequency Allocations and the associated footnotes, and therefore, the United States of America:

1. In view of the fact that this Conference has failed to provide adequate allocations for the HF broadcasting service, particularly at 6 and 7 MHz, reserves on this matter as indicated in a separate statement made jointly with the delegations of Saudi Arabia, Cyprus, Spain, Greece, the United Kingdom, Sri Lanka and Zambia;
2. Reserves the right to operate stations in the mobile satellite service in the frequency range 235 to 399.9 MHz as indicated in a separate statement made jointly with the delegations of the Federal Republic of Germany, Belgium, Denmark, Greece, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom and Turkey;
3. In the operation of stations in the radiolocation service on a primary basis in the bands 430–440 MHz, 5 650–5 850 MHz, 8 500–8 750 MHz, 8 850–9 000 MHz, 9 200–9 300 MHz, 9 500–9 800 MHz, 10 000–10 500 MHz, 13.4–14 GHz, 15.7–17.3 GHz and 33.4–36 HGz, cannot guarantee protection to or coordination with other services;
4. Reserves the right to operate stations of the fixed, mobile and radiolocation services on a primary basis in bands as specified in the footnotes pertinent to frequency bands 470–806 MHz and 890–960 MHz, without the condition specified in these footnotes that make such operations, subject to agreement under Article N13A. The United States will coordinate its usage of such services with neighbouring administrations which are affected;
5. In view of the fact that the Conference failed to provide adequate allocations for the HF maritime mobile service, particularly below 12 MHz, states its intention to satisfy maritime mobile requirements in the several HF bands below 10 MHz allocated to the mobile service on a primary basis.

No. 39

For the United States of America:

The administration of the United States of America, calling attention to the fact that some of its broadcasting in the high frequency bands allocated to the broadcasting service are subject to willful harmful interference by administrations that are signatory to these Final Acts, and that such interference is incompatible with the rational and equitable use of these bands, declares that for as long as this interference exists, it reserves the right with respect to such interference to take necessary and appropriate actions to protect its broadcasting interests. In so doing, however, it intends to respect the rights, to the extent practicable, of administrations operating in accordance with these Final Acts.

FINAL PROTOCOL (COUNTER) STATEMENTS

No. 72

For the United States of America:

With reference to statement No. 9 by the Government of the Republic of Cuba, the Government of the United States of America notes that the United States presence in Guantanamo is by virtue of a treaty in force; the United States reserves the right to meet its radiocommunication requirements there as heretofore.

No. 75

For the Federal Republic of Germany, Australia, Austria, Belgium, Canada, Denmark, the United States of America, Finland, France, Greece, Ireland, Italy, Japan, the Principality of Liechtenstein, Luxembourg, Norway, New Zealand, Papua New Guinea, the Kingdom of the Netherlands, Portugal, the United Kingdom of Great Britain and Northern Ireland, Sweden, the Confederation of Switzerland:

The above-mentioned delegations, referring to the reservations made by the Republic of Colombia, the People's Republic of the Congo, the Republic of Ecuador, the Gabon Republic, the Republic of Kenya, the Republic of Uganda, the Somali Democratic Republic and the Republic of Zaire in statement No. 40 and by the Republic of Indonesia in statement No. 42, consider that, in as much as these statements refer to the Bogota Declaration of 3 December 1976 by equatorial countries and to the claims of those countries to exercise sovereign rights over segments of the geostationary-satellite orbit, the claims in question cannot be recognized by this Conference, and that the decisions of this Conference regarding the assignment and use of frequencies and orbital positions in the geostationary orbit are fully in accordance with the International Telecommunication Convention (Malaga,Torremolinos, 1973) by which this Conference is bound.

[Appendix III]

DECLARATION

The Administrations of the USA, Canada, UK, Netherlands, Australia, Belgium, which are member-countries of INTELSAT, recognizing the importance of the bands 3.4–3.6 GHz and 4.5–4.8 GHz for use by the fixed-satellite service (FSS), agree as follows:

(1) They shall not by reason of footnotes 3736, 3736A and 3748B withhold support for the implementation of the FSS in these bands by INTELSAT either as to the space segment, or as to the use of the band 4.5–4.8 GHz in any country other than those listed in footnote 3748B.

(2) They shall make reasonable effort to accommodate FSS consistent with footnotes 3736, 3736A and 3748B and the normal procedures of the INTELSAT Organization.

The above mentioned Administrations will advise their Signatories to the INTELSAT Agreement accordingly.

[The following letter was subsequently supplied for the record:]

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., June 7, 1982.

Hon. CHARLES H. PERCY,
Chairman, Committee on Foreign Relations,
U.S. Senate,
Washington, D.C.

DEAR MR. CHAIRMAN: In connection with the Foreign Relations Committee's May 18, 1982 hearing on the WARC–79 Conference, Senator Harrison Schmitt submitted a letter and statement for the hearing record. The Committee provided copies of these documents to the governmental witnesses appearing at that hearing and requested written responses thereto for the record. This letter provides the requested response from the Commission's witness.

I appeared before the Committee on May 18 and testified in favor of ratification of the Final Acts of WARC–79. Although my testimony was given independently on behalf of the Commission, my appearance at the hearing was as a part of a panel of governmental witnesses composed of representatives of the Commission, the Department of State, NTIA, and DOD. Also appearing as witnesses at that hearing were the Director of Technical Programs for Motorola and two representatives of the American Radio Relay League. Without exception, the other six witnesses personally appearing before the Committee testified in support of prompt Senate advice and consent to ratification of the Final Acts.

Senator Schmitt's letter and statement, on the other hand, requests that Senate action on the Final Acts of WARC–79 be deferred. His reasoning is that delay until results of the upcoming ITU Plenipotentiary Conference have been evaluated will possibly place the United States ". . . in a better position to determine what our prospects are for reaching acceptable agreements at future conferences."

Senator Schmitt's evaluation is correct that we should not approach international conferences in isolation. As you know, the Plenipotentiary Conference will not deal directly with frequency allocation issues like WARC–79, but will concern itself mainly with administrative and organizational matters. In the past, conferences dealing with frequency allocation matters have been linked directly to other conferences dealing with similar subject matters; for example, ratification of the 1977 Broadcast Satellite WARC was delayed so that it could be considered with ratification of WARC–79. Deferral of action on WARC–79 will further delay ratification and implementation of meaningful provisions of the 1977 Broadcast Satellite WARC, as amended and clarified by provisions of WARC–79. This in turn could adversely impact our ongoing preparations for the upcoming Region 2 Broadcast Satellite WARC.

The Final Acts of WARC–79 came into force for those administrations who had approved them in January 1982. Although the Commission has issued a series of Notices of Inquiry to posture itself for implementation of the Final Acts, it has not yet actually implemented them. In this regard, it should be noted that potential U.S. users of newly allocated spectrum have been anxiously awaiting ratification and subsequent Commission action to implement the provisions of the Final Acts. Given the tenuous linkage between ratification of the Final Acts of WARC–79 and the potential outcome of the Plenipotentiary Conference it would appear that we would be unduly penalizing U.S. users, while having very little impact (if any) on the ITU member administrations, should ratification action be deferred.

In summation, it would appear to me that the present delay in ratification has already prevented the early enjoyment by U.S. users of the benefits and protections of the provisions of the Final Acts of WARC–79. In analyzing the very thoughtful statement of Senator Schmitt, I found many of his concerns well placed. However, on balance and in my view, further delay would not serve the interests of the United States and U.S. users.

Sincerely,

KALMANN SCHAEFER,
Assistant to the Chairman for
International Communications.

Senator MATHIAS. Thank you, Mr. Schaefer.
Mr. Cook.

STATEMENT OF WILLIAM J. COOK, STAFF ASSISTANT, OFFICE OF THE DEPUTY UNDER SECRETARY (COMMUNICATIONS, COMMAND, CONTROL, AND INTELLIGENCE), DEPARTMENT OF DEFENSE

Mr. COOK. Thank you, Mr. Chairman.

I am here to represent the views of the Department of Defense. We also support the prompt ratification of the final acts of the World Administrative Radio Conference. The final acts are to us a generally acceptable compromise. Ratification will cause no appreciable harm to U.S. national security.

Changes in our systems and procedures will be required, but these changes would have been required in any event. WARC–79 for us represented more a reflection of world conditions rather than the cause of these conditions. In many instances we are currently undertaking negotiations with our allies in other host countries which will supplement the WARC–79 final acts.

Prompt ratification of the acts by the United States is needed to clarify the position of the United States in these bilateral international negotiations.

That concludes my statement. Thank you very much.

Senator MATHIAS. You managed to make it concise. Thank you very much.

Would one of you or perhaps more than one of you care to express a view on this? Would you explain very briefly the reason why the United States felt it necessary to reserve five points on the results of WARC?

Mr. JANSKY. Mr. Chairman, I think I probably could address some of that. Actually, I think there were probably eight points where in fact the U.S. delegation chose to take what we refer to as a reservation. These were areas in which after long weeks of negotiation we could not come to a satisfactory compromise.

It was felt in light of this it was necessary to include in the final document a protocol which is essentially stated in these areas that we, the United States, would have to reserve its position. They included such areas as high frequency broadcast allocations, jamming, a counter statement concerning sovereignty involving the geostationary orbit, and several political statements, if you will, concerning statements that have been made by other countries.

In addition, there were several allocation comments concerning the use of fixed and mobile radio location bands in the 470 to 806 megahertz and 890 to 960 megahertz bands. Finally, there was a statement concerning the maritime mobile service in some bands below 10 megahertz. Basically these are areas on which we could not agree and therefore felt a requirement to reserve our position.

Thank you.

Senator MATHIAS. Do any other members of the panel want to address themselves to the reservations?

Mr. Cook.

Mr. COOK. A good many of these reservations were in support of national security interests, particularly the last reservations that Mr. Jansky mentioned with respect to radio location, or more commonly referred to as radar. The Department of Defense operates probably the largest number of radar units worldwide for purposes of national security. Probably every aircraft, every weapon system, almost anything you can imagine that is used by us for national defense involves the use of radar in some form.

Radio location by its nature is very difficult to operate with other systems without causing harmful interference to these other systems. However, most of the world that remains; that is, the nonindustrialized world, has little use for radar. Therefore, it was their idea to share or to operate radio locations along with other radio services, like mobile radio systems and like fixed radio systems.

This would have presented great difficulties for us if we had accepted that operation in every case. Therefore, it was necessary for us to inform the world that yes, indeed, the United States would continue to operate its radio location services in support of national defense, and we believe that it was necessary for our national defense and that we could not guarantee protection for these other services that they may wish to use. These were essentially technical reservations.

Senator MATHIAS. Are these reservations of such a character that it would be your advice to the Senate to attach them to the resolution of ratification itself?

Mr. Jansky.

Mr. JANSKY. I call your attention to the document that contains the final protocol of the conference [indicating].

Senator MATHIAS. That is the message from the President transmitting the protocol?

Mr. JANSKY. That is correct. It does make a good bookend. [General laughter.]

But in addition, it does contain the language of the reservations taken by the United States in this protocol. So if you were to treat this in its entirety, then you would have accomplished your objective, I think.

Senator MATHIAS. Well, we can do one of several things. We can take the protocol as is with the reservations merely being a part of the legislative record, or we could actually attach them to the ratification resolution.

Mr. Salmon.

Mr. SALMON. Mr. Chairman, it is not necessary that they be attached to the resolution. It is sufficient that they be included in the legislative record. They are statements which have been made. But we appreciate your question.

Senator MATHIAS. I want to be absolutely clear on the process by which we will go forward.

Mr. Schaefer, did you have a comment?

Mr. SCHAEFER. I have just one comment lest there be the wrong impression created here that the United States was the only country that took any reservations to that conference, although as Mr. Jansky indicated, we did take five and then a few others in collaboration with other countries. There were many countries that have taken reservations on any one particular aspect of the final acts. I simply want to say for the record that the United States was not alone in the process of taking reservations on particular aspects of the final acts.

Thank you, Mr. Chairman.

Mr. SALMON. Mr. Chairman, I might just add one point. Referring to my testimony, I did mention the ITU 1974 Maritime Radio Conference. It would be our intention in the instrument from the President after action by the Senate that we make reference to this reservation.

Senator MATHIAS. Let me ask Mr. Cook what he feels the key national security issues are which face us in future negotiations and what is being done to protect the vital interests of the United States.

Mr. COOK. Probably the most important new issue that we face is the issues of the Space Conference. At the current moment the issues are very cloudy because the conference is an open-ended conference. At the moment, the conference agenda includes everything imaginable with respect to space operations. As we move along, that agenda will be narrowed and we will have a better feeling for exactly how it would impact on national security.

We would see that that particular conference has probably more potential impact for national security operations than anything we see in the near future. We would see that of almost equal importance to national security as to the World Administrative Radio Conference itself.

Senator MATHIAS. Are there any other comments on the national security questions that will arise in the future?

[No response.]

Senator MATHIAS. What is the current U.S. position regarding technical assistance to the developing world for communications systems and assistance through the regular assessed budgets of the United Nations or agencies such as the ITU?

Mr. SALMON. If I may, Mr. Chairman, our approach to assistance of developing countries in the areas of telecommunications is that such projects, many of them being very capital intensive, be handled by the United Nations development program. As the UNDP assesses what steps might be taken in a country to best advance its economic activities, it may be that telecommunications would bear the best fruit of investment. Telecommunications should compete with other areas of the economy to determine which would merit priority in the investment of scarce funds.

There has been a good deal of attention in the ITU that that forum become a means for channeling such assistance. We are most sympathetic to the interests of the developing countries and to those in the secretariat wishing to use the ITU in that form. However, for such activities as large capital-intensive projects, we do believe we should stress the use of the UNDP.

We will be supportive of technical assistance activities in the ITU when it is used as a consultative forum. We are also supportive of technical assistance for communications in UNESCO's international program for the development of communications and in our bilateral affairs, which include telecommunications projects.

Senator MATHIAS. Were there any concessions or commitments made with respect to technical assistance at WARC-79?

Mr. SCHAEFER. Mr. Chairman, I do not think any concessions were made. I think there was a heightened awareness by all present in WARC-79, including the United States, that this issue certainly in preparation for future conferences will require an increased and more intensive attention by all concerned.

Various resolutions to that effect were produced, some of which the United States also supported, in particular in the area of assistance and training in the area of frequency management, which is in dire need in some parts of the world. We certainly felt that both the United States and those countries would benefit from that kind of program because through better understanding of the principles of frequency management, perhaps some of the less useful rhetoric that takes place at these conferences would be eliminated.

Thank you, Mr. Chairman.

Senator MATHIAS. I have a number of other questions that are rather technical in nature. I think perhaps it will be more practical for me to submit them in writing to you and ask you to submit your replies promptly. They will be included in the record as a part of this hearing.

I would ask you one final question, however. Would you assess what you feel were the major successes and major failures of the conference?

Mr. **Schaefer**. That is the $64,000 question.

Mr. **Jansky**. In 10 words or less? [Laughter.]

Senator **Mathias**. You can have 15 words.

Mr. **Jansky**. Thank you.

I think from our perspective in the executive branch, at least, our major success was actually surviving the conference with the basic structure of allocation and management of the use of the world's telecommunications intact. It was a very large time of testing and negotiation.

We were very pleased that, contrary to much of the preliminary pre-WARC rhetoric throughout the world, many of the confrontations that were prophesized really did not come to pass. In fact, many nations of the world were able to sit down and, out of their own self-interest, sit down and negotiate what they needed in order to move forward in a progressive fashion to satisfy their own telecommunications requirements.

From the executive branch standpoint specifically, we were able to obtain recognition for new systems and new spectrum. The Earth Exploration Service, for example, is one case in point. We were able to accomplish this through a great amount of cooperative discussions with many countries.

It seems to me this is going to be the type of approach we will have to use in the future if we are to continue to be successful. I might add we were also able to retain protection for the literally billions of dollars of systems, of telecommunications systems, and I think, for example, in the defense area that Mr. Cook referred to, we were able to obtain recognition for these systems so they will be able to enjoy the ability to carry out their intended functions. Happily so.

Those are what I would consider our major successes.

Mr. **Schaefer**. Mr. Chairman, if I understood your question correctly, you said the successes or failures of the conference and not necessarily of the United States in the conference. Did I understand that correctly? I have two separate answers, depending on which way you go.

Senator **Mathias**. I did ask what were the successes and failures of the conference broadly, but since you have made a dichotomy between that and the U.S. interests, maybe you had better address yourself to both parts of the question.

Mr. **Schaefer**. I think as far as the United States is concerned, Mr. Jansky just very ably outlined, and we would go along with that presentation, the U.S. successes of the conference. So let me perhaps address the conference in general.

Senator **Mathias**. The global view?

Mr. **Schaefer**. Right, the global view. I think any time you take approximately 150 countries in a huge conference, there are bound to be some sparks, and there were. In the first week of the conference there were some overtones of nationalistic and political concerns.

Senator **Mathias**. That is fairly normal for the first few days of an international conference.

Mr. **Schaefer**. True.

Senator MATHIAS. People arrive with speeches in their briefcases, and they would feel that the paper was wasted if they didn't deliver those speeches.

Mr. SCHAEFER. That is correct. And they were delivered with some zeal in some cases. But afterward it was amazing how 150 countries were able to settle down and deal with very complex technical issues and allocate, in effect, resources in an equitable fashion between the various services and among the countries.

I do think the conference was a success in its own right, but where in my personal view it perhaps did not do as well is in the area of resolving some of the more critical areas such as space. Mr. Cook made reference to the space conference which we are facing in the mid-1980's where the agenda is quite open.

Between now and then, we will have to wrestle to try to finalize an agenda. The conference could have tackled perhaps more efficiently setting a more specific agenda for these conferences, but this is a minor failure or lack of results in comparison with what the conference did achieve.

Senator MATHIAS. I thank you all very much. We will be propounding certain questions to you in writing.

Now, while we have you here as an administration team, I feel obliged to note at this point in the record that the Senator from New Mexico, Mr. Schmitt, will be submitting a statement as a part of the record. I do not want to prejudge what may be in that statement, but I believe that Senator Schmitt has some concerns about acting prior to the plenipotentiary conference dealing with high frequency broadcast issues, which I understand will be held in September of this year.

Mr. SCHAEFER. The plenipotentiary will be held later this year but it will not deal with H-F frequencies. The H-F frequency conference is in 1984.

Senator MATHIAS. Well, maybe Senator Schmitt would like you to delay action on this until that time. At any rate, he has some concerns and has been publicly quoted as saying that the Senate should refuse to ratify the 1979 World Administrative Radio Treaty or to delay, at least, doing so until the United States has more clearly defined its international communications policies.

I merely make this a matter of record at this time because I think it is a more efficient way to deal with Senator Schmitt's questions than to allow them to lie dormant in the Legislative Branch and have them only erupt when they get to the Senate floor, if we can work out these problems.

Now, I know each of you, being experienced Government officials, are well aware of the statute which makes it a violation of law to call up a member of the legislature and try to prevail upon him in any way, but I am sure you will find a way of communicating within the limits of the law to find out what Senator Schmitt's questions are.

Mr. SALMON. Thank you, Mr. Chairman. We will do so.

Senator MATHIAS. Thank you all.

[Senator Schmitt's prepared statement follows:]

PREPARED STATEMENT OF HON. HARRISON SCHMITT, A U.S. SENATOR FROM NEW MEXICO

Mr. Chairman, the economic structure, social fabric and national defense of our nation are based increasingly on a sophisticated system of communications and information services. The American industries that provide these services and equipment are among the most productive and vital in the world. Their future and the future of our nation depend upon the continued availability of the radio spectrum and geostationary satellite orbits. The effective use of spectrum and orbit resources requires coordination. However, the disparity among nations over particular needs and existing investments, and the philosophical differences among nations, promise to make decisions on these matters much more difficult in the future than they have been in the past.

The Final Acts of the General World Administrative Radio Conference (WARC-79), which are now before this Committee and the Senate for advice and consent to ratification, reflect these growing tensions. In fact, as the study done for the Committee on Commerce, Science, and Transportation by the Congressional Office of Technology Assessment concluded: "Many of the important consequences of WARC-79 were derived from resolutions and recommendations approved by the conference and from reservations and declarations by individual countries, indicating a refusal to be bound by a particular decision of the conference or agreeing to undertake certain actions in order to conform to a decision."

The study pointed out that 87 resolutions and 90 recommendations were adopted by WARC-79, many of which can have far-reaching consequences for the United States. These resolutions and recommendations will be referred to specialized world or regional administrative radio conferences.

The United States found it necessary to take formal protocol exception and not to be bound by certain decisions in the Final Acts through 6 reservations covering several issues, service, and frequency bands. Also, the United States entered a formal declaration of intent regarding use of certain frequency bands for fixed satellite service which are used by the United States for military radars and radio location services. There were 77 other reservations on a variety of subjects entered by other nations. Moreover, the table of frequency allocations resulting from WARC-79 has almost 500 footnotes where countries took exception to the table and proposed to operate different or additional services from those appearing in the table.

Clearly, the basic objective of WARC-79, to provide uniformity and certainty in the table of allocations so that countries may effectively plan for their telecommunications needs, was not accomplished. Nor did WARC-79 resolve the major issues that face the United States and the other 154 member countries of the ITU, regarding the future use of the spectrum and geostationary satellite orbit. Resolution of these issues was postponed until later ITU conferences. For example, the Plenipotentiary Conference of the ITU will be held this fall, and will consider changes in the basic convention governing the structure and functions of the ITU.

Decisions taken at that conference will be basic to all future conferences of the ITU, and will directly affect the ability of the United States to protect its interests at these conferences.

My most immediate fear today is that the United States will not be able to protect and promote our nation's telecommunications needs at the Plenipotentiary Conference and at subsequent ITU conferences.

Because of competing interests that are leading to growing differences over the use of frequencies and satellite orbits, there will be definite winners and losers in these conferences. The difficult decisions and ramifications of these decisions cannot be postponed or obviated through reservations or declarations. Given this fact, the traditional U.S. approach in one-nation, one-vote forums is imperiled. Clearly, we can no longer rely on our technical expertise and ad hoc policy development to assure attainment of our future objectives.

In recognition of this fact, I have recommended to Secretary of State Alexander Haig that the United States initiate a serious dialogue on our long-range goals, telecommunications policies necessary to achieve those goals, and the strategies that must be pursued to ensure that we are successful. The results of this domestic dialogue should be taken to international forums for thorough discussion. Unfortunately, because of unconscionable delays in the appointment of the chairman of our delegation and other preparation problems, it is probably too late for us to lay the groundwork necessary to obtain final action at the Plenipotentiary Conference on any solutions to the fundamental issues of allocation and regulation of the radio spectrum and orbital resources. However, I believe we should use this conference to initiate a dialogue on these issues.

In order for the United States to pursue this process, I recommend that the Foreign Relations Committee delay action on the "Final Acts." It is possible that, upon the conclusion of the Plenipotentiary Conference, we will be in a better position to determine what our prospects are for reaching acceptable agreements at future conferences.

There is ample precedent for the United States to delay ratification. In the past, we have taken various actions to protect our interests. As far back as the 1937 WARC, the United States took a substantive reservation. We refused to sign the Final Acts of the 1950 Mexico City WARC. In recent years, the United States has sought to resolve differences at these conferences without taking reservations, although we did take a substantive reservation at the 1974 Maritime WARC. Most recently, the Department of State declined to submit the agreement reached at the 1977 Broadcasting Satellites Conference because of United States disagreement with the plan for that service.

I am fully aware of the fact that many users of the radio spectrum are anticipating use of additional and new frequencies, authorized by the Final Acts. While delaying ratification may reduce the protection the United States is entitled to internationally under the WARC treaty, I believe our long-range national interests will be served by "biting the bullet" and delaying ratification. Furthermore, this delay will not mean that the United States cannot proceed to implement the provisions of the Final Acts. We are presently proceeding with various activities necessary to conform U.S. operations with the provisions of the Final Acts.

This delay would also be beneficial as a strong signal of Senate disapproval of the dilatory approach of this Administration, which, like its predecessor, has failed to comprehend the extraordinary long-term importance of these ITU conferences.

I ask that the study done at the request of the Senate Committee on Commerce, Science and Transportation on the impact of the Final Acts agreed to at WARC-79, be included in the record of this hearing.

Senator MATHIAS. Our next witness will be Mr. William M. Borman, director of technical programs for Motorola. The record should note Mr. Borman was a member of the U.S. delegation to WARC-79.

Mr. Borman, we are happy to welcome you here today.

STATEMENT OF WILLIAM M. BORMAN, DIRECTOR OF TECHNICAL PROGRAMS, MOTOROLA CORPORATE GOVERNMENT RELATIONS OFFICE

Mr. BORMAN. Good morning. My name is William Borman. I am director of technical programs of Motorola's Corporate Government Relations Office. I was privileged to be a member of the U.S. delegation to the 1979 World Administrative Radio Conference and participated primarily in the work of the Conference regarding the revision of the table of radio frequency allocations.

The 1979 Conference had within its scope the primary charter of revising the table of allocations. This table establishes which radio services may operate in the various radio hands and under what conditions. The last such revision occurred in 1959.

Since then, a number of radio services have grown and new radio services have been established. As a result, much of the work of the 1979 Conference was directed at revising the table to recognize the changing spectrum requirements of the various radio services.

It is evident that the newly revised table incorporates substantial changes and is quite complex. It is also evident that there is a dramatic increase in footnote allocations which were entered to recognize the particular allocation needs of individual nations, groups of nations or subregions.

My remarks this morning will focus on the revised table and its impact on the development of future U.S. policy for the mobile radio services, and the land mobile radio services in particular. I appear this morning to support favorable and early consideration of the final acts of the conference, and I would like to briefly summarize a major benefit that can accrue during the term of this agreement.

By way of background, the Federal Communications Commission in 1968 began a proceeding to relieve the serious spectrum crowding occurring in the land mobile radio services and subsequently reallocated spectrum in the 806 to 947 megahertz radio band domestically. The FCC also implemented geographic sharing of land mobile and UHF television broadcasting in major metropolitan areas.

Both actions have proven highly successful throughout the country, except in the border area where the then existing agreements were based on the table of allocations brought into force by the 1959 WARC. The 1959 agreement did not authorize mobile services in these radio bands.

The border area problem has been significant since an estimated 26 million people in our border States cannot benefit by the changed allocation instituted 14 years ago. Even today, although bilateral arrangements are nearing implementation, the spectrum is not available to the people in these areas.

In addition to these two domestic actions, which were not in consonance with the 1959 international table of allocations, the 1979 WARC preparatory work indicated the potential need for future adjustment of domestic allocations to the mobile services due to the high and sustained growth rate of these services.

As a result, two of the principal U.S. objectives were, one, to obtain international agreement and recognition in the table of allocations of land mobile services in the 800 to 900 megahertz to be consistent with our already implemented domestic policy, and two, to attain flexibility in the international table of allocations so that any necessary future changes in domestic allocations would not be frustrated in our border areas, due partially or solely to the lack of recognition in the international table.

These objectives were accomplished at the 1979 WARC. There was agreement for major portions of the UHF band, and the resulting allocations table contained in the final acts reflect these changes. The remaining portions of the U.S. objectives were accomplished by entry of appropriate footnote allocations and formal reservations as part of the final protocol at the time of signing of the final acts.

These steps, taken together, create a necessary international basis for future domestic allocations flexibility. It is likely, if not probable, that these additional allocations may be required in light of the continuing dramatic growth of these important services.

In summary, the final acts of the 1979 WARC contain a basis for a rational yet flexible allocations policy which, if needed to accommodate future domestic needs, can benefit all our population. The 1959 agreement did not have this foresight. Its approval, the approval of the 1979 final acts, can facilitate the implementation of future changes as needed and militate against future concerns of derogation of the ITU Convention.

That concludes my remarks.

Senator MATHIAS. Thank you, Mr. Borman.

How many other representatives of private industry were at the Conference?

Mr. **Borman**. I would estimate only about a dozen. I would say 12 to 15, I believe.

Senator **Mathias**. In all delegations?

Mr. **Borman**. Within the delegation.

Senator **Mathias**. Within the U.S. delegation?

Mr. **Borman**. Correct.

Senator **Mathias**. About a dozen.

Were other national delegations representative of the private sector or were they only Government representatives?

Mr. **Borman**. By and large, only Government. I know that Canada did incorporate some private sector people, as did Mexico through some of its university people.

Senator **Mathias**. In your judgment, was it effective in reflecting the private sector point of view to have a dozen private sector representatives in the U.S. delegation? Was that as good a way as any other you can think of to reflect the interests of the industry?

Mr. **Borman**. I thought that it was essential. I know the delegates themselves, out of the various industries, from maritime to satellites, to land mobile, these people are well regarded and well respected in the international community. They are excellent representatives of the United States. They know what they are doing.

There was a very good team spirit between the Government representatives and the industry representatives. In many cases the industry view is the more appropriate view, since many of the radio bands are not operated by government but by private industry. So I would say it was very effective.

Senator **Mathias**. Perhaps this is an unfair question because it asks you to assess your own activities, but in reflecting on it in retrospect, do you think there was an adequate job of canvassing the industry before the Conference? Do you think that at any future negotiations there should be some polling of the private sector to ascertain attitudes, or do you think it was adequate?

Mr. **Borman**. Again speaking from my personal experience, I was involved in the preparatory work, which lasted almost 5 years. It got down to a hectic pace. The FCC, through its public notice process, went through, I believe, eight notices. Anyone who had even a fringe interest had opportunities to attend, participate and work with the preparatory groups, the advisory committees and the working groups. Anyone who wanted to participate heavily certainly had the opportunity for that.

I believe the restrictions placed on private representatives may have been excessive, and I know that there has been interest to revise that to make sure that non-Government representatives have essentially equal responsibility and authority, and I would support that. That was somewhat of a negative during the 1979 Conference, but not an overbearing negative.

Senator **Mathias**. Are you aware of any industry opposition to the ratification of the radio regulations or any private groups who oppose it?

Mr. **Borman**. I have reflected on that question because I think it is a very important one: is there any segment of our society where these final acts would not be in its best interest? I do not know of any from my background.

Senator MATHIAS. There already has been a substantial delay in ratification. Is there any danger to U.S. interests' in further delay?

Mr. BORMAN. You raised a very good point from Senator Schmitt. I am not familiar with the details of that proposal. I would think that a timely resolution of the question would be in our interest. The final acts did come into force for some administrations on January 1, 1982, so we are, so to speak, somewhat delinquent.

I think it would be in our interest to have the new table because it does take some time to respond to the changes in that table and to know that it is firm and agreed upon. With that we could begin the process of implementing the changes that have been made.

Senator MATHIAS. Looking into the future, what do you see as the issues of greatest concern to the domestic industry?

Mr. BORMAN. Let me take that in two parts. I am sure we all recognize that many of the difficult problems that were faced in some way at the 1979 Conference, since they were not resolved——

Senator MATHIAS. Most of these problems result from the success of the industry in pushing out into new areas of technology, so when we discuss them as problems, I think we ought to put the problems into proper perspective.

Mr. BORMAN. Perhaps we should call them future opportunities, which they are.

Senator MATHIAS. That is right.

Mr. BORMAN. Since there was not final resolution of some of these questions, a number of future conferences were planned. To give one example in the mobile area, there were a lot of suballocation questions and the sharing of bands by mobile services, so it was decided there would be a mobile conference. It was originally 1986. Now it is 1988. Because of budgetary reasons, we have now postponed addressing some of those questions for a number of years, but it is predicated on adoption of the final acts.

Those are the kinds of opportunities that I think the Conference presented. It would have been nice to have been able to pursue them without any postponement.

Senator MATHIAS. I appreciate very much your being here today, Mr. Borman.

Mr. BORMAN. Mr. Chairman, I could respond in part to your question regarding one of the reservations, reservation No. 4, just so that it is clear. The Conference ran very much like a 10-ring circus, with many important activities going on in parallel. When it came to coordination of allocations between administrations, there was an unknown procedure to be followed, and that procedure was being defined by one of the groups having to do with the radio regulations.

Very late in the Conference, it became clear that that procedure for registration of radio frequency uses would be extremely onerous on small businessmen or small public safety organizations. It would mean a small police department would have to submit an application to go on notice in Geneva that they needed to use some radio spectrum, and the ITU would publish that and then get comments. Well, this would be a time consuming, laborious process, which didn't seem to be appropriate when the major safeguard that was wanted was that there would be coordinated use between adjacent countries.

So the U.S. reservation, really No. 4, said that we would not follow that particular onerous procedure but we certainly would coordinate our usage with neighboring countries.

Senator Mathias. Thank you very much, Mr. Borman. We appreciate your testimony here today.

Mr. Borman. Thank you very much.

Senator Mathias. Our final panel today is composed of members of the American Radio Relay League, more commonly known as ham radio operators. Mr. Victor C. Clark is president of the league, and E. Merle Glunt is a consultant from Mount Union, Pa.

I understand that you are accompanied by Mr. Inlay and Mr. Turnbull.

I am wondering where the No. 1 ham operator of the country is this morning. That is Senator Goldwater.

Let me ask the committee staff, has Senator Goldwater been invited to make any statement on this issue?

[Pause.]

I think in deference to his long experience as a ham operator and also in deference to his commanding position in the U.S. Senate, it would be wise for us to ask him if he has any views on this subject before we close the record. I will so instruct the staff at this point.

Now, Mr. Clark.

STATEMENT OF VICTOR C. CLARK, PRESIDENT, AMERICAN RADIO RELAY LEAGUE (HAM RADIO OPERATORS), ACCOMPANIED BY CHRIS IMLAY, COUNSEL, AND HUGH TURNBULL

Mr. Clark. Thank you, Mr. Chairman.

Our prepared remarks will be kept as brief as possible. My name is Victor Clark and I live in Clifton, Va. I am currently serving as the president of the American Radio Relay League, the national organization of licensed amateur radio operators in the United States.

I have also served for several years as an officer of the International Amateur Radio Union [IARU], and was a member of the observer team sent by the union to the 1979 World Administrative Radio Conference in Geneva. The IARU is a worldwide federation of more than 100 national amateur radio organizations.

The U.S. Government, recognizing the social benefits deriving from a strong amateur service, historically has occupied a leadership position with respect to the provision of privileges and frequencies to us radio amateurs.

U.S. amateurs throughout the years have made effective use of their frequency allocation in the public interest by developing new techniques and instrumentation, providing emergency communications in disaster situations, encouraging and training young people who go on to employ their amateur radio experience as a gateway to a lifelong vocation, and creating through the medium of their international conversations a friendly image for the United States and its people.

Mr. Chairman, at this point I would like to introduce Mr. E. Merle Glunt, a consultant to the American Radio Relay League, and following his testimony, if I may, I would like to make a few concluding remarks.

Senator MATHIAS. Surely.

Let me to say to all members of the panel that we have your statements and they will be included in full in the record.

STATEMENT OF E. MERLE GLUNT, CONSULTANT, AMERICAN RADIO RELAY LEAGUE (HAM RADIO OPERATORS), MOUNT UNION, PA.

Mr. GLUNT. Thank you, Mr. Chairman. I will try to be very brief.

I would like to point out that I do conduct a consulting business from Mount Union, Pa., and not Mount Rainier, which is closer to home here, and do specialize in international conferences and frequency management. My experience goes back to the Federal Communications Commission, from where I retired after 28 years. I was assistant chief engineer for the Frequency Allocation and Treaty Division there and was instrumental in setting up the Conference's preparatory structure for the Commission before I retired. I was a member of the U.S. delegation and was a spokesman at the WARC–79 for terms and definitions and also a spokesman for the Ameteur Radio Service.

During my tenure at FCC prior to retirement and during my work with the American Radio Relay League, I would say that the radio regulations and the frequency allocation proposals which were developed underwent very close scrutiny, and insofar as the amateurs are concerned, the proposals made by the United States were coordinated with the International Amateur Radio Union throughout the three ITU regions, and we are happy to say that the member societies of the International Amateur Radio Union openly received our proposals, and through them there was a high degree of endorsement by their own countries.

Mr. Clark has mentioned the public service aspects of amateur radio, but it is important to know that amateurs, because of their widespread geographic distribution, whether it be nationally or internationally, invariable turn up at the scene of disasters such as the tornadoes and eruptions of Mount St. Helen, for instance, and frequently the very first notice of any such disaster comes from amateur radio stations.

With this in mind, one of the proposals for WARC–79 that we were interested in was the addition of a number of new frequency bands, among which were three high frequency bands which we considered essential to the transmission of our information, many times at the request of governments, which due to the phenomenon of radio propagation, we would not otherwise have been able to conduct during several hours a day.

So to us it is very important that those new bands that have been allocated by WARC–79 would be made available to U.S. amateurs.

Speaking of the results of the Conference, we recognize that any conference involves in many cases a compromise. If it were not for the compromises, we probably would not have the kind of agreements we have come up with. WARC–79 is in that category.

The previous speakers have noted that there were some, we might say, shortcomings that were involved. The amateur service was highly successful in getting a number of their proposals adopted. We view the shortcomings for other services not as of an insurmountable nature, and as you have noted, a number of reservations were taken.

I might say in my experience as a U.S. delegate to numerous ITU conferences during the past several years, I can recall that there was a time when the United States was very reluctant and, as a matter of fact, would not take a reservation. I also noted that knowledge of this tendency worked to our disadvantage because other administrations, knowing that, would keep pushing for agreement.

Reviewing the results of WARC-79, both as U.S. spokesman for terms and definitions and for the amateur service, I believe that on balance the final acts provide a reasonable and workable basis for international harmony in the use of the radio spectrum for many years in the future, particularly noting the adjustments that can be made by the many specialized conferences scheduled for the remainder of this century.

I would like to emphasize that the nearly 400,000 U.S. amateurs are anxiously awaiting implementation of the additional bands. Prompt ratification, of course, is high on the list of expectations of this body. Their enthusiasm is because there are a number of other countries that are already using these bands, and of course, in the case of a new emergency, those countries would be able to communicate but we may not be able to communicate with them.

With that, Mr. Chairman, I thank you for the opportunity to present this testimony.

[Mr. Glunt's prepared statement follows:]

PREPARED STATEMENT OF E. MERLE GLUNT

My name is E. Merle Glunt and I conduct a consulting business from Mount Union, Pennsylvania, specializing in international conferences on frequency management. In this field I have been a consultant to the American Radio Relay League for over seven years. Following 28 years of service with the Federal Communications Commission, I retired in 1975. My final position was that of Assistant Chief Engineer for Frequency Allocation and Treaty Division now known as the International and Operations Division. In that capacity, I was instrumental in establishing the Commission's Conference preparatory structure for the Geneva, 1979 World Administrative Radio Conference (WARC-79) and was responsible for the initiation and acceptance of many proposals from the United States. At WARC-79, I was a full working member of the U.S. delegation and the U.S. spokesman in the Working Group considering the necessary Terms and Definitions which bear directly on the international radio regulations and the use of the radio frequency spectrum. I was also the spokesman for the Amateur Service on the U.S. delegation.

The radio regulations and the frequency allocations proposals developed during the conference preparatory period underwent close scrutiny to ensure that they met not only the requirements of the United States but would fulfill those of other nations as well. Speaking for the Amateur Service, the extensive coordination of Amateur proposals put forth by the United States was undertaken in each of the three ITU Regions through the facilities of the International Amateur Radio Union (IARU). It is safe to say that these U.S. proposals received almost unanimous support from member societies of the IARU, as well as a high degree of endorsement by their administrations.

As you are probably aware, Amateur Radio provides valuable public safety and other emergency communications. It is important to note that Amateurs, because of their widespread geographic distribution, urban, rural, nationally and internationally, are invariably to be found at or near the scene of natural disasters, such as tornadoes, earthquakes, forest fires, and floods. They are frequently the first to initiate communications and rescue efforts for stricken areas.

A proposal for WARC-79, which received full recognition, was the addition of a number of new frequency bands for the Amateur Service. Among these are three high frequency bands which are essential to the transmission of data and safety of life and property information during periods when radio propagation between desired points would be difficult if not impossible on existing bands for several hours a day. We are proud to say that these proposals appear in the Final Acts; their use by radio amateurs in the United States is awaiting only final ratification. A number of other administrations have already ratified the WARC-79 Final Acts and their amateurs are now using those allocations, which were first proposed by the United States.

We recognize that results of any international conference involve many cases of compromise; otherwise, there very well might never be an operable treaty. WARC-79 certainly is no exception. While the Amateur Service worldwide was successful in attaining a number of its goals, any shortcomings which may have been experienced by some of the other services are not of an insurmountable nature. A number of reservations were taken by the United States and appear in the Final Protocol. In my experience as a U.S. delegate to numerous ITU Conferences during the past 15 years, I recall that there was a time when the United States would not enter a reservation, even though a particular provision may have had a serious adverse impact on U.S. operations. Knowledge of this tendency was often used to the disadvantage of the United States by other administrations, as they knew the United States would finally acquiesce. The greater use of reservations by the United States at WARC-79 represented a practical response to this reality.

Reviewing the results of WARC-79, both as a U.S. spokesman for Terms and Definitions and for the Amateur Service, I perceive on balance that the Final Acts provide a reasonable and workable basis for international harmony in the use of the radio frequency spectrum for many years to come, particularly in view of the adjustments that can be provided by the several specialized conferences scheduled for the remainder of this century. The nearly 400.000 United States radio amateurs are anxiously awaiting implementation of the additional frequency bands; prompt ratification is high on their list of expectations of this body.

I thank you for this opportunity to speak, and should note that my experience in Amateur Radio includes 47 years of continuous licensing, over 27 years of which was from the Silver Spring area of Maryland.

Senator MATHIAS. Thank you very much.

Mr. Clark, did you have a few extra words?

Mr. CLARK. Yes. As Mr. Blunt has pointed out, the U.S. delegation to the 1979 World Conference provided strong support for the amateur service, support which culminated in the assignment of additional frequency bands for the use of radio amateurs in the United States and around the world for both experimental and disaster communication purposes.

As of this date, the radio amateurs of more than 40 countries have commenced operation on new frequency bands allocated at the 1979 World Conference. The United States, however, is not yet represented among them, and the nearly 400,000 licensed U.S. radio amateurs, including, I am sure, Senator Goldwater, have been eagerly awaiting permission to join their colleagues on these new frequency bands.

U.S. radio amateurs have been looked up to throughout the world as leaders and innovators, enjoying the full support of an enlightened system of government. We believe that prompt ratification of the WARC Treaty will help to project the proper image of our Government to millions of amateurs around the world.

On their behalf and on behalf of the radio amateurs of the United States, I would like to urge that the U.S. Senate advise and consent to the ratification of the 1979 Geneva radio regulations and final protocol.

Thank you very much.

[Mr. Clarks' prepared statement follows:]

PREPARED STATEMENT OF VICTOR C. CLARK

My name is Victor Clark, and I live in Clifton, Virginia. I am President of the American Radio Relay League, the national organization of licensed amateur radio operators in the United States. I have been a member of the Board of Directors of the League and an Officer for about 12 years. I have also served for several years as an officer of the International Amateur Radio Union (IARU) and was a member of the observer team sent by the Union to the 1979 World Administrative Radio Conference in Geneva. The IARU is a worldwide federation of more than 100 national amateur radio organizations. My experience as a licensed radio amateur began in 1933.

The United States Government, recognizing the social benefits deriving from a strong Amateur Service, historically has occupied a leadership position with respect to the provision of privileges and frequencies to its radio amateurs. U.S. amateurs, through the years, have made effective use of their frequency allocations in the public interest by developing new techniques and instrumentation, providing emergency communications in disaster situations, encouraging and training young people who go on to employ their amateur radio experience as a gateway to a lifelong vocation, and creating through the medium of their international conversations, a friendly image for the United States and its people.

Mr. Chairman, at this point I would like to introduce Mr. E. Merle Glunt, a consultant to the American Radio Relay League. Following his testimony, I would like to make a few concluding remarks.

As Mr. Glunt has pointed out, the United States delegation to the 1979 World Administrative Radio Conference provided strong support for the Amateur Service—support which culminated in the assignment of additional frequency bands for the use of radio amateurs in the United States and around the world—for both experimental and disaster communication purposes.

As of this date, the radio amateurs of more than forty countries have commenced operation on new frequency bands allocated at the 1979 World Conference. The United States, however, is not yet represented among them, and the nearly 400,000 licensed U.S. radio amateurs have been eagerly awaiting permission to join their colleagues on these new frequency bands.

Not readily apparent to the layman is the fact that activities on the amateur radio frequencies offer a vivid picture of the conditions of the world and its people. The freedom with which radio amateurs are permitted by their governments to function, and the immediacy with which this fact is evident from listening to the transmissions of the world's radio amateurs from day to day, tell a story that transcends propaganda efforts and is at once candid and revealing.

U.S. radio amateurs have been looked up to throughout the world as leaders and innovators, enjoying the full support of an enlightened system of government. We believe that prompt ratification of the WARC treaty will help to protect the proper image of a government that, having sought and attained an objective at an international conference, follows through with its timely implementation.

On behalf of the radio amateurs of the United States, I would like to urge that the United States Senate advise and consent to the ratification of the 1979 Geneva Radio Regulations and Final Protocol.

Thank you very much.

Senator MATHIAS. Thank you, Mr. Clark.

Before I address several questions to you, I would note that you live in Virginia and Mr. Glunt lives in Pennsylvania, but you had the wisdom, foresight and prudence to bring with you Mr. Turnbull and Mr. Imlay, both of whom live in Maryland. [General laughter.]

Mr. GLUNT. Mr. Chairman, I would like to point out that for over 27 years I was also a resident of Silver Spring, Md., and was one of your constituents.

Senator MATHIAS. I regret the aberration in your judgment that has removed you from our midst. [General laughter.]

How would the activities of ham operators be affected if we did not ratify, if we prolonged the delay in ratification? Mr. Clark, I think, just said they were anxious to go forward with using the new bands but what other things are there?

Mr. Clark. Some of the new bands that have been allocated by the World Conference provide propagation characteristics that differ from the bands currently used by amateurs. They make possible communications to certain parts of the country, certain parts of the world at times of day that are not possible or are not easily possible on other bands. This would facilitate communications of that type as well as experimentation on those frequencies with which we have no familiarity at this point.

Mr. Glunt. I would elaborate on one point, if I may. There are three additional high frequency bands that were set aside for us at this Conference. One of the strong arguments for this was to fill the propagation gap that existed.

An important consideration was the fact that a disaster communications service, particularly operated by the Swiss Government, wanted to operate on the amateur bands. They fully supported this additional amount of spectrum in order to enhance their own ability to move into a disaster area on behalf of the Swiss Government and any other government that wished to support them. The disaster communications was one of the more important considerations.

Thank you.

Senator Mathias. I suppose you are in a better position to be able to testify what other people think around the world than any group of citizens who speak for an organization and ever come before this committee because you have an opportunity to communicate directly. How do hams around the world feel about it in other countries?

Mr. Clark. I have just returned from a conference of radio amateur societies, national amateur radio societies, held under the auspices of the International Amateur Radio Union in Manila, the Philippines, at which some 15 countries were represented. One of the principal topics of conversation was the assignment of the new frequency bands under the World Conference.

We frankly were embarrassed when folks would ask us when are you going to get your band, or why haven't you been on the bands already. In the course of the Conference, the chief of the Philippines' equivalent of the Federal Communications Commission came to the meeting and presented a document to the Philippine amateurs assigning the permission to operate on one of the new bands authorized by the World Conference. At the same time, we were told that the same permission had been granted to some 520,000 amateurs in Japan. So we feel as though we are just a little bit behind.

Senator Mathias. One of the concerns of this committee constantly is the way in which we conduct our relations with other nations on a whole spectrum of issues ranging all the way from nuclear arms to coping with hunger and instability in many parts of the world. It is not only the issues themselves in which we are interested but the procedures, the mechanisms by which we deal with these issues.

Can you give a grade to the U.S. delegation to this Conference? Do you think the members were prepared? Do you think they were representative of both the Government interests and the private sector interests within the United States?

Mr. GLUNT. I would like to answer that question, Senator. I think without question the U.S. delegation was the best prepared delegation for this Conference. This is not surprising because it has been the best prepared delegation for many conferences, and I have attended several. The United States is looked up to for leadership. In many cases administrations go to a conference and do not have a single proposal, but they take their cue from the United States.

It is true that in the past few years we have encountered a little more difficulty from some of the developing countries, but even with them, after the political rhetoric is out of the way, we find that they are visiting individual members of the U.S. delegation, seeking advice, what they should do, what the effect of these proposals might be and how they might get something for themselves that would appear in the record.

From that standpoint, looking at the international preparation with the teams that went overseas and thoroughly explaining what we wanted to do, even though sometimes they met with opposition, which is natural because, after all, everybody has his opinion, they were very successful, however.

Senator MATHIAS. If everybody agreed before the Conference, you wouldn't need a conference.

Mr. GLUNT. Well, if you look at the results of the Conference, it pretty much comes down the way the United States and perhaps the United Kingdom and French wanted it. But let me add, from domestic standpoint I will say this. I have prepared four conferences since the 1959 Geneva Conference. In all my years of preparation I have never seen the private sector brought more thoroughly into the preparation of a conference than it was this time.

Sometimes it was very exasperating because of the inexperience of the individuals, but nevertheless I think the delegation and the predelegation groups were very receptive to the views and problems of the private sector. I think Mr. Borman pointed this out also. This was the first time that I was a member of the private sector, sir, and I certainly had no misgivings about the open door policy that the Government extended to us.

Thank you.

Senator MATHIAS. You said there were some difficult issues and some that roused particular opposition. What were the toughest ones to negotiate?

Mr. GLUNT. Well, I can only speak for the amateur service. It was quite evident that we had a problem on one of the frequency bands, at least, with respect to a conflict with international broadcasting. As that issue developed, we were unable to obtain the necessary compromises that we thought might have been possible prior to the Conference itself, but it ended up that we reached a status quo situation for the United States, and U.S. interests were protected.

In some of the UHF bands, we did lose some spectrum which we considered important to us. One of them, of course, was to provide for the national defense. We certainly have no complaint about that. On the other hand, we did gain a number of new segments of the spectrum, which would certainly provide us with the opportunity to do experimentation and research and development, which is important to the amateur service.

Thank you.

Senator **Mathias**. Thank you very much.

We appreciate your attendance here today and your counsel, knowledge and experience.

Mr. **Clark**. Thank you very much.

Mr. **Glunt**. Thank you.

Senator **Mathias**. I will pursue Senator Goldwater for any contribution that he cares to make.

Thank you very much.

This meeting will stand adjourned.

[Additional questions and answers follow:]

STATE DEPARTMENT'S RESPONSES TO ADDITIONAL QUESTIONS SUBMITTED FOR THE RECORD

TECHNICAL ASSISTANCE PROGRAMS FOR LDCS IN COMMUNICATIONS

Question 1. Is the United States working to counteract LDC efforts to raise this issue at the 1982 Plenipotentiary Conference?

Answer. The issue of technical cooperation and assistance within the ITU is clearly on the agenda of the 1982 Plenipotentiary and is expected to be one of the three or four major items considered by the Conference. The U.S. Preparatory Committee has been actively working on this subject to identify possible initiatives we might put forward and to develop appropriate positions on a large number of technical assistance possibilities. These range from NTU's role in executing UNDP projects involving hardware procurement, training fellowships and expert assistance, to more and better technical handbooks designed for use by developing countries, to enhanced seminars and training programs on such subjects as spectrum management, application of the ITU Radio Regulations and preparations for upcoming radio conferences. The U.S. Delegation to the Plenipotentiary will be fully prepared to handle this issue.

Question 2. What funding has been and is being provided by the United States through UNESCO, the World Bank and UNDP, as well as USAID for these purposes? Are there other avenues through which such funding is channeled?

Answer. Funding for technical assistance programs related to communications is channeled through a number of organizations and Government agencies, although the major avenues are UNDP for multilateral programs and USAID for bilateral assistance. The Department of State is currently gathering data and information on the extent and scope of U.S. Government assistance in this area as part of our preparations for the 1982 ITU Plenipotentiary Conference. A copy of our findings will be forwarded to the Committee when it is completed. In the interim, a recent document which summarizes USAID activities is attached for your information.

Question 3. What coordination exists within the U.S. Government to insure that efforts are not duplicated by these different agencies?

Answer. An adequate coordinating mechanism exists in the Interagency Group (IG) chaired by the Under Secretary of State for Security Assistance, Science and Technology. The IG considers all aspects of international communications and information issues, and coordinates and approves Administration policy in this field. Its membership includes State, FCC, NTIA, the Agency for International Development, the International Communication Agency, Commerce and Treasury, each of which is involved with technical assistance in communications to some degree. The IG served as the focal point for coordination and approval of the U.S. objectives and position to the UNESCO meeting on the International Program for the Development of Communications (IPDC) held in Acapulco early this year, and will serve a similar role for ITU Plenipotentiary activities.

Question 4. Would an increase in technical assistance to the LDCs by the United States enhance our relationship with these countries on telecommunications matters?

Answer. The question of enhancing the U.S. relationship with LDCs through an increase in technical assistance in communications is a very complex one. With respect to the ITU forum and in particular its various conferences and meetings, there is broad national agreement that technical assistance oriented toward general improvement of each nation's understanding and capability in such areas as spectrum management, application of the international Radio Regulations and the technical standards developed by the ITU, would benefit all countries including the United States. International discussion and negotiations, it is assumed, would be undertaken on the basis of substance and analysis, rather than rehetoric suspicion and one-sided technical exchanges.

The implementation of or increase in other assistance programs may well improve the U.S. image and signal a greater degree of cooperation and understanding to other countries, with possible side benefits to our objectives at upcoming conferences. However, any such increase or new initiative would have to be accompanied by reasonable assurances that the program serves a worthwhile interest, the costs are consistent with the expected benefits, and the technical assistance is consistent with overall U.S. policy objectives. The preparatory group for the Plenipotentiary is attempting to identify acceptable new initiatives or program increases which would satisfy these criteria and possibie enhance other U.S. objectives.

Question 5. Is the expense during a time of U.S. budget austerity worth the effort?

Answer. Yes. Technical assistance to the developing countries—whether bilateral or multilateral—serves important long-term U.S. interests in the telecommunications field. We must pursue those interests continually, consistent with the current financial situation; moreover, the amounts involved are very small compared to the overall size of telecommunications activities and the market. Technical assistance, in raising he competence level of communications authorities in developing countries, makes them more understanding of the technical arguments of our negotiators and reduces the emotional aspect of the negotiations—it specifically tends to reduce the North-South confrontations. Moreover, technical assistance can play a very important role in increasing the recipient country's capacity to absorb new equipment and systems; to the extent that the U.S. participates in such programs, it can also take advantage of the important commercial opportunities which can follow, and which our competitors certainly are aware of.

REPRESENTATION ON DELEGATIONS TO COMMUNICATIONS CONFERENCES

General Comment: The difficult process of determining the composition was guided primarily by the specific items on the WARC agenda and in the U.S. proposals, with full recognition of the fact that the Conference would conduct its work on the basis of a complex mix of technical, legal, economic, political, national security, and other factors. The resulting delegation reflected this mix of personnel. The largest group of delegates consisted of key individuals drawn from the frequency management sector, which has a large degree of "technical" interest, but also considerable economic, legal and political background. The head of delegation provided direct legal and policy background, in addition to his many other skills. Delegates from State Department, augmented by supporting staff of the U.S. Mission in Geneva, provided diplomatic, political and legal expertise. Many of the thirteen delegates from industry provided much more than a technical qualification, including strong legal and economic background. Finally, the delegation was rounded out by the five public interests delegates.

Question 6. How effective were the public interest group representatives at WARC–79? Did they contribute significantly to the mission of the U.S. delegation? If not, was this because they were not prepared for the conference as fully as the technical and State Department representatives, most of whom were from the federal government and had been part of the preparatory process for a longer period of time? Would the inclusion of public interest representatives earlier in the preparatory process enhance their positions on U.S. delegations to ITU meetings, or is there simply no role for them to play in such issues? Should Congress promulgate guidelines on when to include public interest group representatives or delegations, and how vigorously the State Department should seek to ensure that all interested parties are in fact represented?

Answer. The delegation included five public interest representatives who were funded under the Biden amendment program. The effectiveness of these delegates varied from very effective and useful with major contributions to the achievement of U.S. objectives to relatively ineffective participation. The representatives which proved most effective were those who participated actively in the preparatory work (principally in the FCC's Advisory Committee and

Notice of Inquiry and in the Department's Advisory Committee), knew the issues and had the particular expertise needed by the delegation. The least effective were those who had peripheral interests or late exposure to the many years of preparatory work or who were able to attend the Conference for only a limited period of time.

In summary, there is clearly a role for public interest group representation on delegations to conferences such as WARC–79; however, their effectiveness depends primarily on their individual interest and qualification with respect to the issues. Earlier participation in the preparatory process, particularly the FCC activities which are directed to all non-governmental interests, would enhance their usefulness. The inclusion of public representatives on U.S. delegations will be considered for upcoming conferences whenever their participation would be appropriate.

Question 7. Did the State Department make an adequate effort to include on the delegation representatives of all groups with interest in the WARC–79 deliberations?

Answer. Every effort was made in this regard, consistent with Department guidelines to limit the delegation to the minimum necessary to represent U.S. interests and good management practice to limit the number of delegates to a controllable size. It must be recognized that many of the industry and Government delegates, including some from the FCC, should be regarded as "user group" representatives. It should also be understood that all aspects of an issue—manufacturing, user group, regulatory, and foreign positions, for example—were treated in delegation position papers for the use of U.S. spokespersons.

ROLE OF INDUSTRY REPRESENTATIVES

Question 8. Should this exemption be extended to all ITU conferences, or are there valid concerns about industry representatives advocating the interests of their companies when such views might conflict with overall U.S. policy?

Answer. The Administration favors clarification of the role of private sector representatives to international telecommunications conferences. Specifically, we support the thrust of Section 306 of S. 2467, which treats this problem, although we prefer the more narrowly drawn language that has appeared in other legislative proposals, including the fiscal year 1982–83 Appropriations Bill for the Department of State. Current practice is to draw extensively upon the private sector for its experience. As a practical matter, we would adhere to the provisions of the State Department Guidelines which permit private sector representatives to speak and clarify technical questions, but reserves the enunciation of U.S. policy to Government officials.

Question 9. What problems of this nature arose at WARC–79, if any?

Answer. None arose. The primary spokesmen for the delegation were U.S. Government officials. However, in anticipation that active participation of some of the industry representatives would be very useful in the negotiations, the Department took steps before the Conference to certify eight of the industry representatives under the one-time exemption provided by Congress for WARC–79. These individuals were used extensively to augment and support our designated spokesmen.

Question 10. Does industry have too great an influence on U.S. proposals to ITU conferences as some critics have charged?

Answer. The U.S. mechanism to prepare for ITU conferences clearly provides for all national interests to be presented, considered and taken into account in the development of proposals and negotiating positions. In particular, the FCC's Notice of Inquiry process is an entirely public forum that encourages full participation in WARC preparations. The U.S. CCIR Advisory Committee also provides a public forum for all views to be expressed in the development of technical and operational aspects of conference preparation. In summary, all elements of the communications sector—manufacturers, carriers, operators, user groups, public interest groups, regulators, and Federal Government agencies—have full opportunity to express their views. The resulting proposals will be influenced by the facts presented.

PREPARATIONS FOR FUTURE CONFERENCES

General Comment: There are currently six ITU radio conferences scheduled through 1988 as a result of recommendations by the WARC–79. Specific dates and duration, as well as the definitive agendas, are subject to further consideration at the Plenipotentiary Conference later this year and at future meetings of the Administrative Council, and to approval by the Council and ITU members. Only the first two conferences have been approved thus far and the third is now before ITU members for their approval. The six conferences are as follows:

1. Mobile Services WARC, February 1983.
2. Region 2 Broadcasting Satellite RARC, June 1983.
3. HF-Broadcasting WARC (two sessions), 1984/86.
4. Space Services WARC (two sessions), 1985/87.
5. Region 2 MF-Broadcasting RARC (new bands), 1986.
6. Mobile Services WARC, 1988.

Question 11. Are there adequate personnel resources at the various Federal agencies responsible for preparing the U.S. positions for these conferences?

Answer. The schedule of future conferences imposes a heavy burden on the personnel and financial resources of both the ITU and individual ITU members. This is particularly true for the United States in light of the current budget austerity. Our delegation to the Plenipotentiary and subsequent Council meetings will continue to push for a more reasonable schedule that spreads out the conference program over a longer time period, thereby reducing the burden. In the meantime, preparations will be carried out using available resources consistent with the importance of the conference to the U.S. and with other priorities.

(NTIA Comment): The very heavy schedule of future conferences that evolved from WARC–79 will cause most Government agencies to adjust their priorities of spectrum management projects in order to perform the proper preparatory efforts. This heavy schedule in the face of personnel reductions in many agencies further exacerbates the problem. In spite of this problem the preparatory work that proceeded on schedule and no preparatory task has been neglected.

(FCC Comment): Reflecting an overall trend toward decreased Federal spending, the Commission (like most governmental agencies) is experiencing reductions in manpower and financial resources. Since international matters are but a portion of the overall important mission and objectives of the Commission, resources applied to international are being reduced proportionately. However, the Commission recognizes the importance of international matters, especially the preparation for and participation in international conferences impacting Region 2. Consequently, international resource reductions are occurring only where streamlining, better coordination and efficiencies can be achieved. We believe we have sufficient personnel resources for international conference preparation responsibilities and for achieving the Commission's fourth of five stated objectives: "To promote the coordination and planning of international communications which assures the vital interests of the American public in commerce, defense and foreign policy." Should it develop that increased resources will be needed, the Commission will be prepared to request additional funds from Congress to counter that unexpected event.

Question 12. If there are inadequate personnel resources at the State Department, should additional budgetary slots be allocated for ITU preparatory activities?

Answer. Present personnel resources at the State Department are barely adequate for the current level of ITU preparatory activities, recognizing the Department's principal role as one of coordination and carrying out international communications policy. The Department relies heavily on FCC, NTIA, industry and other interested parties to assist in the development of proposals and to participate on the delegations to the various conferences. Any deficiencies in regard to staffing will be addressed as required.

Question 13. Alternatively, if the argument that ITU conferences should focus on technical rather than political issues is accepted, should the lead role be transferred to another agency?

Question 14. Who should be responsible for interagency coordination?

Answer. (13.–14.) As explained in the answer above to another question, the issues to be considered at upcoming ITU conferences, as at the WARC–79, involve many factors and not just "technical" or "political" issues. The U.S. preparations and participation must take into account all aspects—technical, political, operational, economic, legal—as well as overall foreign policy considerations. There is an adequate coordinating mechanism chaired by State Department to ensure that all relevant views are considered in developing policy. The lead role for overall ITU matters and the responsibility for interagency policy coordination should remain with a Department which addresses a broad range of issues and interests as part of its day-to-day mission, and has the capability to advance U.S. interests through concerted actions on a variety of fronts.

COORDINATION ON RELATED COMMUNICATIONS MATTERS IN INTERNATIONAL FORUMS

Question 15. Is there adequate coordination between Government preparations for the ITU conferences and UNISPACE 1982?

Answer. Yes. The U.S. preparatory activities headed by Ambassador Helman of the Department has active participation by spectrum management staff of FCC, NTIA and NASA, as well as by the Department's Office of International Communications Policy which has primary responsibility for ITU matters. Position papers and briefings on ITU matters such as the use of the geostationary orbit, the frequency spectrum, and the role of the ITU have been prepared for the UNISPACE delegation. The proceedings and results of the Outer Space Conference will be monitored closely to determine potential impact on ITU activities, e.g., the Plenipotentiary Conference and the 1985/87 Space WARC.

Question 16. What coordination mechanisms exist both within the State Department's various offices and between the State Department and other Federal agencies, such as the National Aeronautics and Space Administration, for developing U.S. positions to be presented at these conferences?

Answer. U.S. proposals and related positions for ITU radio conferences originate primarily in the preparatory mechanisms of the FCC (Notice of Inquiry) and the NTIA (Interdepartment Radio Advisory Committee), well in advance of the conference. All U.S. interests—Federal agencies, the private sector and the public in general—have every opportunity to participate in this process. Preparations of U.S. positions for other international forums and conferences proceed in a similar manner, with a clearly designated lead agency/office and an established process leading to recommended positions. Close day-to-day exchange and coordination exists among the various offices of State Department and among the interested or affected Federal agencies. Final coordination and approval of U.S. policy and positions is ensured in the Interagency Group on International Communications and Information Policy chaired by the Under Secretary of State for Security Assistance, Science and Technology.

Question 17. What other U.N. and international activities could similarly benefit from a strong coordination of efforts with other U.S. Government activities in support of the United Nations?

Answer. All U.S. Government activities in the area of international communications are coordinated through the Interagency Group. Current issues involve the activities of ITU, the Outer Space Committee, UNISPACE 1982, UNESCO and its IPDC, OECD, United States-Canada and other bilateral matters. The agenda will, of course, vary depending on the international issues which arise and on the need or desire for interagency coordination.

NEED FOR CONTINUING BILATERAL AND MULTILATERAL EXCHANGES

Question 18. What impact did the WARC–79 bilaterals have in reducing areas of dispute between the United States and other countries?

Answer. The program and extent of consultations with foreign countries prior to WARC–79 is described on pages 7 and 8 of the U.S. Delegation Report (submitted separately for the record). The main advantage of the bilaterals was to gain an understanding of foreign views and international reaction to specific U.S. proposals, which allowed the U.S. to reconsider its position or to develop an appropriate negotiating strategy which would maximize chances of success. In addition, the bilaterals provided an invaluable opportunity to meet foreign officials in a desirable one-on-one basis which in many cases gave the U.S. delegation direct and personal access to foreign delegations during the Conference.

Question 19. Does the State Department have an adequate program for continuing bilateral and multilateral talks in relation to the upcoming ITU conferences? Is additional support (money, personnel, etc.) required for these activities? What countries are or should be regularly included in these types of discussions?

Question 20. If the State Department does not have such a program, should Congress require the Department to develop one in order to provide a better foundation on which the United States can base its proposals to the ITU and possibly expedite the decision-making process?

Answer. (19.–20.) The U.S. preparatory effort for each of the upcoming ITU conferences, under the coordination of State, has an appropriate program for continuing talks with foreign governments, consistent with the agenda of the conference, its importance to U.S. interests, and the costs-benefits of such an activity under current budget austerity. It is likely that a more active program of foreign visits would be carried out under less restrictive budgetary considerations; however, the current level of activity is considered to be adequate at this time.

The countries and international activities visited will depend on the specific conference and the issues to be considered, although in many cases, the United States carries out discussions with Canada, the United Kingdom, France, Federal Republic of Germany, U.S.S.R., Japan and Australia. Developing countries include Mexico, Brazil, Venezuela, India, China, Algeria, Nigeria, Cameroon, Senegal and Kenya. NATO's Allied Radio Frequency Agency (ARFA) is an important forum to discuss and coordinate national security issues. Regional groups, such as Europe's CEPT, the OAS's CITEL and Asia's ASEAN group, provide very useful forums to carry out foreign consultations, depending on the issue involved.

SUCCESS OR FAILURE

Question 21. What, in each of your views, were the major successes and failures of this conference?

Answer. Any attempt to place some form of numerical score on the success of WARC–79 is extremely difficult, if not impossible, in view of the complexity of the issues, and the negotiations that took place in Geneva. The important fact is that major U.S. objectives were met and that the results far exceeded the expectations of many participants and observers.

From the perspective of specific United States interests, the major successes of WARC–79 included: (1) the incorporation of considerable flexibility in the revised international Table of Frequency Allocations; (2) preservation of the basic structure of allocation and management of the use of the spectrum on a worldwide basis; (3) recognition of new systems (e.g., Earth Exploration Service) and new spectrum (e.g., expansion of the AM broadcasting band); (4) retention of protection for expensive telecommunications systems already in place; and (5) avoidance of disruptive political confrontations that had been predicted prior to the conference. From a broader perspective, the Conference was an overall success in its own right, since approximately 150 countries were able to equitably allocate resources among the various interests and radio services competing therefor and to deal with the extraordinarily complex issues before them.

With regard to failures of the Conference, probably the most significant one relates to the future conferences program recommended by WARC–79. Each conference by itself responded to the needs and desires of a large segment of the ITU, but together, they resulted in an extremely heavy burden on the limited resources of the Union and individual administrations. The several Resolutions and Recommendations originated independently in various committees and working groups at the Conference without any efforts to examine the implications of the overall program. This "decision" of WARC–79 has created suspicion and ill-feelings on the part of developing countries as the United States and other concerned countries try to stretch out the program to ease the burden and to allow sufficient time for proper preparation. One might also regard the fact that the United States took several reservations as a failure of the Conference. However, this action by the delegation is regarded as essential to protect certain U.S. interests which were not in conformity with the desires of the majority at WARC.

Question 22. What in your opinions are the major international communications issues facing the United States in the immediate future and what is being done to prepare for them?

Answer. Although there are many international communications issues that will affect the United States in the 1980's, two major issues in the immediate future involve the ITU itself and "Space." With regard to the former, preparation for participation in the ITU Plenipotentiary Conference (Nairobi, September-November 1982) has been underway for some time under the aegis of the Preparatory Committee for the Plenipotentiary Conference (PC/PC). Primary participation in the PC/PC has been by the Department of State, NTIA, FCC, NASA, ICA, DOD, and the White House. The Plenipotentiary Conference is extremely important because of the election of ITU officials, the issue of future conference scheduling and planning, the administrative structure of the ITU, budgetary considerations of ITU activities, and financing of the ITU by member administrations.

With regard to "Space," questions which may have a significant impact on the United States (particularly orbital spacing, allotment of orbital slots, and allotment of usable satellite spectrum) will be addressed in the Space WARC scheduled to begin in 1985. Preparations for the Space WARC and Plenipotentiary Conferences are well along and are discussed elsewhere in this document.

SPACE SERVICES

Question 23. Insofar as U.S. interests are concerned, is *a priori* planning as bad as certain U.S. interest groups would have it appear?

Answer. *A priori* planning can not be characterized as categorically good or bad. The answer depends on many factors, including the specific radio service and frequency band involved and the type of planning considered. For example, an *a priori* plan might be fully specified in all its technical and operational aspects, resulting in a plan so rigid and inflexible that it is non-responsive to emerging requirements and technological advances. This type of *a priori* plan is generally regarded as bad, not only to U.S. interests, but also to the interests of all countries. On the other hand, there are other types of *a priori* planning approaches which will provide reasonable guarantees to all countries and satisfy real requirements as they arise. National preparatory efforts for the 1985/87 Space WARC under the FCC, NTIA and the U.S. CCIR organization are studying the question in great detail.

Question 24. Some developed countries (for example, Britain) supported *a priori* planning for the broadcasting satellite service while the United States opposed it, so not all developed countries seem to agree with the U.S. position on this. Have any studies been performed by either the U.S. Government or industry to demonstrate the exact effect *a priori* planning would have on technological growth in satellite systems?

Answer. At the time of the 1977 Broadcasting Satellite WARC, European countries did not foresee an immediate need for broadcast satellites, but they did project large requirements for new terrestrial fixed (line-of-sight) facilities throughout Europe. One possibility to satisfy these urgent requirements with existing technology was to utilize the frequency band 11.7–12.5 GHz, which was allocated to the fixed service as well as the broadcasting satellite service (BSS). Their hands were tied, however, until a WARC was held to carry out DBS planning. It was for this reason, and not the desire to support *a priori* planning of BSS, that the Europeans pressed for the 1977 WARC and the decisions which were adopted. They viewed their urgent requirements for developing additional terrestrial facilities as more important than their—and our—concerns about rigid planning.

Studies to analyze and demonstrate the effects of various *a priori* and other planning approaches are being carried out, as a matter of priority, within the national preparatory effort for the 1985/87 Space WARC.

Question 25. The United States supported across-the-board *a priori* planning for all radio services in the 1940's and early 1950's. Why did the United States change its position on this issue?

Answer. The United States has supported *a priori* planning for some radio services in certain frequency bands since the early development and implementation of radio. Examples include the aeronautical services in the high frequency band (in view of the safety considerations) and the maritime radiotelephone service in the high frequency band (due to the nature of international operations). In addition, certain radio services have been planned domestically on an *a priori* basis, although retaining a high degree of flexibility for implementation. The planning process has been, and continues to be, on a carefully considered, case-by-case basis.

Attachment.

U.S. AGENCY FOR INTERNATIONAL DEVELOPMENT, ASSISTANCE PROGRAMS IN COMMUNICATIONS, JANUARY 1982

AID assistance in communications is typically designed as an element of a broader development project, rather than as a communications project in itself.

Typically, AID programs assist user agencies who wish to employ already existing communications infrastructures for specific development objectives; in particular, to provide information for rural populations in health, education, agriculture, nutrition, or family planning. Support for new communications infrastructures in rare (except within special economic support programs in the

Near East). Training, technical assistance, and the support of pilot projects are major elements of AID assistance. Support for the use of radio predominates; in addition, a new exploratory program centers on rural telecommunications by satellite.

Current AID efforts have an emphasis on assisting nations to explore new ways to provide for basic educational opportunity and to increase rural access to development information. AID-assisted efforts have been associated with several recent trends: a growing confidence in the use of classroom radio to serve primary schooling need; the increased use of localized radio and feedback systems to intensively support health and agricultural development schemes; and new explorations of rural telephony, through the rapidly emerging technology of low-cost satellite earth stations. A major AID priority is to make information available about experience with these new approaches.

The following compilation describes most current AID projects which include communications components of significant size. In addition, many other projects include print communications as an element of broader projects; these are not included here because of the practical difficulty in estimating those print components. In addition, this report does not contain data concerning the related area of remote sensing, a major field of AID activity.

TOTAL COMMUNICATIONS-RELATED OBLIGATED FUNDS

[In thousands of dollars]

AID component	Cumulative fiscal years 1975 through 1980	Expected obligations fiscal year 1981
I. AID DEVELOPMENT ASSISTANCE FUNDS		
Bureau for Science and Technology (programs in all regions)	21,619	5,630
Bureau for Latin America and the Caribbean	18,452	2,870
Bureau for the Near East	2,290	1,415
Bureau for Africa	11,701	0
Bureau for Asia	8,990	1,100
Total	62,052	11,015
II. AID ECONOMIC SUPPORT FUNDS		
Bureau for the Near East	21,500	45,000
Grand total	83,552	56,01

[In thousands of dollars]

Type and title	Description	Initial year	Cumulative obligations fiscal year 1975 through fiscal year 1980	Expected obligations fiscal year 1981
BUREAU FOR SCIENCE AND TECHNOLOGY				
Multisectoral:				
936-5011—AID Rural Satellite Program.	To test the cost-effectiveness of new communications satellite technologies for facilitating rural development programs (Peru, Indonesia, Senegal, the Caribbean).	1979	3,990	2,500
931-1231—Development Communications Clearinghouse.	To provide worldwide information and services on the application of appropriate technologies in development communications (both print and nonprint media), through the operation of a U.S.-based information clearinghouse.	1976	723	260
931-1109—Communications Studies and Applications.	To assist LDC's to introduce communications methods into operational programs.	1977	3,394	250
Project development aid: national seminars; policy studies.	Activities in Bolivia, Costa Rica, Egypt, Haiti, Indonesia, Jamaica, CAR, Lesotho, Liberia, Peru, the Sahel, Sudan, Yemen, Tunisia.		(2,815)	(250)
Jamaica Radio	For local agriculture radio broad-		(549)	0

[In thousands of dollars]

Type and title	Description	Initial year	Cumulative obligations fiscal year 1975 through fiscal year 1980	Expected obligations fiscal year 1981
	casting.			
Guyana Health Program	For two-way radio systems in support of health care.		(30)	0
Small Projects; Miscellaneous	Analyses of communications-related issues, state-of-the-art studies.	1975	150	30
Education:				
931 - 0569 — Applications of Radio to Primary School Mathematics.	Develops a low-cost instructional radio system for teaching the primary school mathematics curriculum; diffuses knowledge of the approach to LDC's (Nicaragua, Thailand).	1973	2,802	0
931-1017—Extension of Rural Primary Schools.	To design, implement, and evaluate in collaboration with personnel from LDC's, a prototype system of teaching basic language skills using radio as the major medium of instruction (Kenya).	1979	1,202	500
936-5807—Community Basic Education.	To develop a viable, tested, cost-effective community basic education system that extends access of primary level education to the rural poor children using radio as a primary medium for instruction (Dominican Republic, first pilot site).	1981	0	250
Health:				
931-1018—Mass Media and Health Practices.	To develop a system and methodology for the use of mass media in health education by conducting R. & D. projects in 2 LDC's aimed at the treatment and prevention of infant and early childhood diarrhea (Dominican Republic, the Gambia).	1978	1,109	40
931-0225—Soybean Utilization	Develops a methodology for introducing unprocessed and simply processed soybean as a food staple among the rural poor in LDC's uses media to promote the concept (Bolivia).	1976	1,364	0
931-1180—MEDEX III, Primary Health Care.	Provide communication planning for facilitating worldwide program in local health delivery.	1978	225	0
Population:				
932-0630—Strengthening Institutional Population Communication and Training (University of Chicago).	Improves professional leadership and operational performance of the information, education and communications components of LDC population and family planning programs (phase II).	1977	2,160	800
936 - 5900 — Accelerated Delivery Systems Support.	To provide short-term consultants in a variety of professional and technical fields relating to population/family planning programs in developing countries.	1979	1,476	800
936-3005—Program Grant to the Population Council.	To support the Population Council's programs of technical information to the international population/family planning community, and of providing funds and technical assistance of institutions in developing countries for service delivery systems, research, evaluation, training, and contraceptive marketing.	1978	50	50
Nutrition:				
931-1010—Changing Maternal Weaning Diet Practices.	To provide assistance to LDC's to promote desirable infant feeding practices, including breast feeding and weaning; and improved dietary practices in pregnant and nursing women.	1979	2,174	0
931-1065—Technical Assistance in Nutrition Education.	To document, disseminate, and facilitate application in LDC nutrition programs of educational techniques capable of promoting nutrition programs; also, to provide resources to assist and train personnel of host governments and/or designing, implementing, and evaluating programs using modern communication approaches for improving nutrition.	1979	800	150

[In thousands of dollars]

Type and title	Description	Initial year	Cumulative obligations fiscal year 1975 through fiscal year 1980	Expected obligations fiscal year 1981
Health: 521-0087—Maternal and Child Health and Family Planning in Haiti.	Information/education activities including broadcasts, materials production and training services.	1978	3,246	497
Population:				
520 - 0237 — Population and Family Planning in Guatemala.	Promotional, Informational and publicity activities.	1977	1,050	0
519-0149—Family Planning and Population—El Salvador.	Mass media program advertising family planning services.	, 1963	7,083	1,500
515-0132—Family Planning Services—Costa Rica.	Development of education/dissemination materials to promote family planning.	1978	1,154	343
Nutrition:				
596-0065—Nutrition Programs in the Central American Region.	The project provides publications, data processing and visual aids in support of nutrition education in Guatemala, Panama and El Salvador.	1976	1,660	100
522 - 0124 — Nutrition Planning—Honduras.	To increase the Government of Honduras' capability to analyze, plan, execute, and evaluate nutrition programs; and to support programs for the rural poor in nutrition education, water supply, environmental sanitation, and pilot production of nutritious food.	1976	390	0
L-522-0124 (loan portion)—Nutrition Planning—Honduras.	do	1976	120	0
BUREAU FOR THE NEAR EAST				
Population:				
Family Planning Communications in Tunisia.	Uses diversified radio announcements, assesses the potential of special television programs to reach illiterate rural populations in French and Arabic and develops special movie theatre announcements.	1978	202	1,415
263-0029—Family Planning—Egypt Communications Component.		1977	4,000	0
Agriculture:				
278-0192—Water Management Technology for Jordan—Communications Component.	The training component will provide information to farmers in new equipment use and maintenance and in crop water management. The training component will prepare and show relevant films and slides.	1977	1,320	0
268 - 0311 — Reforestation—Ministry of Agriculture—Lebanon Communications Component.	Funds are provided for the partial replacement of commodities lost during the hostilities. Audiovisual equipment will be used to support other communications in support of the agricultural extension work.	1978	768	0
Telecommunications:				
Near East (Economic aid: Economic support fund Egypt.				
263 - 0054 — Telecommunications—Egypt.		1978		
263 - 0075 — Telecommunications—Egypt.		1979	17,500	45,000
263 - 0117 — Telecommunications—Egypt.		1980		
AFRICA BUREAU				
Telecommunications: 669-0111—Telecommunications Support to Liberia.	The project provided a microwave network between Monrovia, Harpa and the Ivory Coast telecommunication system to connect the Liberian traffic with the INITELSAT ground station there. It also provides the link into the Liberia INTELSAT-B station.	1975	6,000	0

[In thousands of dollars]

Type and title	Description	Initial year	Cumulative obligations fiscal year 1975 through fiscal year 1980	Expected obligations fiscal year 1981
Education:				
Instructional Television—Ivory Coast.	Evaluation of nonformal programs	1977	151	0
Survey of Rural Radio in the Sahel.	Seminar and study of rural radio activities.	1979	50	0
669-0134—Rural Information Systems—Liberia.	To establish a rural development radio network system, which supports development activities of Liberia Ministries and agencies involved in rural development.	1980	500	0
L-669-0134 (loan portion)—Rural Information Systems—Liberia.	do	1980	5,000	0
BUREAU FOR ASIA				
Education:				
367-0123—Radio Education Teacher Training—Nepal.	Utilization of radio for the training of primary schoolteachers.	1977	3,285	0
879-025—Communications Technical Applications Satellite—University of South Pacific.	Demonstrates the utility and effectiveness of voice, slow-scan and video transmissions by satellite for the operations of university outreach and extension programs.	1970	705	100
497-0296—Educational Communications Development—Indonesia.	To assist the Government of Indonesia with the development and implementation of a national capability in educational communications development.	1979	1,000	1,000
497-0296 (loan portion)—Educational Communications Development—Indonesia.	do	1980	4,000	0

COMMENTS OF THE DEPARTMENT OF STATE ON THE STATEMENT OF SENATOR SCHMITT REGARDING DELAY IN RATIFICATION OF WARC-79

The Department fully shares many of the concerns expressed by Senator Schmitt in his statement and covering letter to the Committee on Foreign Relations concerning ratification of the Final Acts of WARC-79. The extreme importance of the continued availability of the radio spectrum and geostationary satellite orbit to the economic structure, national defense, American industry and the future of our nation in general is acutely obvious to us all. We are concerned in particular about the potential impact of the upcoming ITU conferences and the ability of the United States to adequately prepare for and participate in these and other important international conferences throughout the decade.

We and others in the Executive Branch regard the results of WARC-79 as a substantial success, well beyond the expectations of many of the participants and the grim predictions of some observers. The details are covered in the Report of the Chairman of the U.S. Delegation to WARC-79 which I ask to be included in the record of this hearing. The success at WARC-79 was the result of years of national preparation and a sound interagency coordination structure and governmental process leading to the development of U.S. proposals and positions for the Conference.

We have not, however, rested on this success. Since WARC-79, the Department and other concerned agencies have taken a number of positive steps to improve coordination and preparation for the upcoming conferences, with particular attention given to their importance, complexity and inter-relationship of issues. Senior level attention and coordination is assured through the Interagency Group chaired by Under Secretary Buckley. Day-to-day working level coordination and planning is carried out under the Department's Coordinating Committee for Future Radio Conferences. Detailed national work programs have been or are being prepared for each important radio conference to spell out all aspects—technical, legal, economic, policy, national security, etc.—of the desired preparatory effort. We have already initiated, at Senator Schmitt's suggestion, the new dialogue on our goals and policies referred to in his statement, including a new initiative with Canada to exchange views on communications policy issues of mutual concern. We are confident that these steps, among others, will place the United States in the best possible position to achieve the objectives and protect its interests.

For several reasons, however, the Department does not share the Senator's conclusion that the ratification of WARC-79 Final Acts should be delayed. Firstly, the new Radio Regulations adopted by WARC-79 came into force on January 1 of this year for those countries indicating their approval. The revised table of frequency allocations and technical provisions are now the basis for national and international discussions, planning and orderly use of the spectrum/orbit resource. The United States will contribute to international order and harmony in the area of day-to-day telecommunications operations through ratification, whereas further delay will likely cause additional suspicion and tension, especially among developing countries.

Secondly, the United States identified a broad range of new or expanded requirements for various radio services, such as AM broadcasting, broadcasting satellite and amateur radio in the private sector, and satellite remote sensing, navigation satellite and military mobile satellite in the federal government sector. We proposed the necessary changes to the allocation table and achieved all or a substantial part of our objectives. Ratification is required to proceed with full national implementation of the necessary regulations. It will also provide a degree of certainty, particularly in the private sector, that will allow interested parties to proceed with system planning and investment needed to utilize the new provisions.

Thirdly, the Department fully shares the view expressed by the Defense witness in that ratification is required to assist the military Departments in their dealings with foreign countries. Defense is negotiating a number of agreements with host countries, and telecommunications issues comprise a very important part of these discussions. Foreign governments have been reluctant to proceed in this area because of their uncertainty as to further action the United States may take with respect to WARC-79 decisions. Delay in ratification will further exacerbate the situation.

Several points presented in the statement appear to indicate a misunderstanding of the WARC-79 results and other aspects of the ITU. The Report of the Chairman of the U.S. Delegation, which we requested above be included in the record, will provide a complete account of the conference proceedings as they relate to U.S. interests. The Department wishes to correct the record with respect to several times contained in the statement.

The statement concludes that the basic objective of WARC-79—to provide uniformity and certainty in the allocation table—was not accomplished, in view of the 177 Resolutions and Recommendations 83 reservations, and almost 500 footnotes. The purpose of the Conference was not to establish worldwide "uniformity", but rather to review and revise the existing allocation table based on the needs of ITU members. The table has not been "uniform" for more than forty years, in recognition of the varying needs of regional groups or individual countries, and of the technical possibilities (e.g., propagation characteristics) which permit different uses depending on need. Footnotes have always been a part of the table, and while there were a small number of undesirable notes adopted, the vast majority are quite appropriate and satisfactory. The large number of Resolutions and Recommendations stem more from the growing complexity of telecommunications—for example, seventy-five of them pose specific problems or questions to the CCIR for technical study—than the results of tensions and inability to reach decisions. A large part of the others relate to the specific issues resulting from or referred to a specialized radio conference (e.g., aeronautical and maritime) because the matter was not included on the agenda of WARC-79. The number of statements in the final protocol were not excessive in view of the scope and importance of the Conference. Pages 99–103 of the Delegation Report provide further information on the protocol statements.

The statement indicates that WARC-79 could not resolve major issues facing the ITU and the U.S., in regard to the future use of the spectrum and geostationary orbit, and postponed them until later ITU conferences. WARC-79 was not competent, by design, to treat certain radio services, since ITU members felt that six months or more would be required to treat all matters in the Regulations. For this reason, the agenda of WARC-79 included an item to consider and recommend a program of future conferences to treat specific radio services. This included the mobile services, high frequency broadcasting and the space services, among others. The issue conidered at the WARC involved the agenda and general approach to each of the proposed future conferences, rather than the substantive issue itself. The main problems in this respect arose because some countries wanted to pre-determine the outcome of some future conferences, e.g., the 1985/87 Space WARC, through its agenda.

The statement implies that ITU conferences, and in particular the more difficult upcoming conferences, are zero-sum games, with clearly defined winners and losers. We consider this to be a completely inaccurate characterization of the ITU process. All countries felt that they came away from WARC–79 as a winner and that the Conference was a success. We consider it premature to assume that there must be losers at any of these conferences, and have tried to incorporate this philosophy into our current preparatory efforts for each of them.

There is an apparent misunderstanding that the Plenipotentiary Conference to be held later this year will continue the WARC–79 discussions on the issues of allocation and regulation of the radio spectrum and orbital resources, and will provide a forum to consider final solutions. This is not the case, except possibly in some indirect ways. The substance of these issues of concern is the proper role of Administrative Radio Conferences and not the Plenipotentiary, although the latter might choose to develop guidelines for a future conference such as the Space WARC. The Plenipotentiary will consider the timing and financial aspects of the overall future program which may affect specific conferences and associated preparations. The U.S. intends at the same time to continue a dialogue on these issues at every appropriate opportunity at the Plenipotentiary and to protect our interests.

Finally, the statement incorrectly indicates that the Department of State declined to submit the agreement reached at the 1977 Broadcasting Satellite WARC. The actual situation is presented in the Department's Letter of Submittal to the President regarding ratification of WARC–79. The most relevant portion is as follows: "The Department did not consider it appropriate to recommend ratification of the Final Acts of the 1977 Conference, since the United States planned to propose to the 1979 Conference substantial changes to the frequency allocations that would drastically alter the technical bases on which the decisions of the 1977 Conference were based, and on which the future regional conference would carry out its planning. In fact, the 1979 Conference did make substantial changes to the frequency bands involved, which greatly improve the allocation provisions of the radio services concerned."

The Department appreciates the opportunity to provide comments on the Statement of Senator Schmitt. We have already provided comments regarding the study carried out by the Congressional Office of Technology Assessment in our letter of March 31 to Senator Goldwater. It is requested that this letter (attached) also be included in the record of the hearing.

Attachments.

UNDER SECRETARY OF STATE,
FOR SECURITY ASSISTANCE, SCIENCE AND TECHNOLOGY,
Washington, March 31, 1982.

Hon. BARRY GOLDWATER,
U.S. Senate.

DEAR BARRY: On March 5 I sent an interim reply to your February 26 letter asking for our views on OTA's Assessment Report of the 1979 World Administrative Radio Conference (WARC–79). This letter addresses the OTA Findings more extensively, although our views are still somewhat preliminary in a number of respects.

Finding No. 1: Urgent need for high level government attention to policy coordination and accountability for international telecommunications issues.

In my earlier letter I described actions we had taken to sharpen our focus on telecommunications and information policy issues, and to assure Department principals were cognizant of the important stakes implicit in this policy area. The establishment of an Inter-Agency Group (IG) which I chair, and the creation of the position of Coordinator for International Communications and Information Policy, will meet these objectives.

Finding No. 2: Streamlined processes, coordinated policies and sufficient resources are essential to effective and timely conference preparation.

I consider that the inter-agency coordination structure, and the governmental processes leading to the development and implementation of international communications and information policy are sound. They have served us well in the past, including WARC–79, and have placed us in a firm position with respect to preparations for the several upcoming radio conferences. It is regrettable the Report apparently concludes otherwise.

You may be interested to know that steps have already been taken to identify a work program for each important radio conference scheduled through 1987. As an example of our preparatory work, I am enclosing a copy of the National Preparatory Program for the 1985/1987 Space Services Conference.

The Department, Commerce and the Federal Communications Commission are primarily responsible for the management of our preparatory efforts for radio conferences. Each contributes substantial resources to this work. We are constantly assessing with them the adequacy of the available resources; in those instances where we foresee difficulties, we will, in consultation with the Congress, take appropriate measures to ensure our preparatory work is thorough and effective.

Finding No. 3: New U.S. approaches are necessary to address spectrum/orbit issues in a changing world environment.

We agree with this observation. In preparation for the 1977 Broadcasting Satellite Conference and the 1979 WARC, the Government agencies and the private sector considered a number of possibilities aimed at determining whether there were alternative approaches to spectrum and orbit utilization. These and further studies, including the approaches suggested in the OTA Report, are integral to our preparatory work for the forthcoming conferences. In addition, the U.S. participates actively in the studies being carried out by the ITU's International Radio Consultative Committee in preparation for the conferences.

Finding No. 4: WARC–79 resulted in the loss of some flexibility in certain areas—mostly military—and enhanced opportunities in many other areas.

We believe the Finding is a fair characterization of WARC–79 results, but would note that reservations taken by the U.S. Delegation, and alternatives available for future system development, will substantially mitigate the loss of flexibility. The National Telecommunications and Information Administration and the Federal Communications Commission are responsible for domestic implementation of WARC–79 decisions. The Department stands ready to assist if either agency, or the Senate, determine that further international or treaty action is required as a result of the domestic implementation process.

Finding No. 5: Operating and administrative costs will increase as a result of WARC–79, and interference protection will become less certain.

We believe more analysis and examination of available options is required before fully accepting this Finding. It is, of course, true that a very considerable level of effort is required to prepare adequately for the radio conference period envisaged by WARC–79, and at the 1981 session of the International Telecommunication Union's Administrative Council we were successful in reaching agreement on an extended timeframe.

In addition to addressing the Findings of the OTA Assessment Report, you asked that we comment on a number of other observations found in the Report. With respect to the need for increased attention to spectrum management, I can assure you we fully support the efforts of the National Telecommunications and Information Administration and the Federal Communications Commission to establish a spectrum management training program for entry, mid- and senior-level managers. We have suggested specific courses to these agencies, and have endorsed their participation in courses on negotiation techniques.

I noted earlier my satisfaction with the process which is in place for developing and implementing telecommunications policy. As it pertains to radio conferences, it involves a Department-chaired Coordinating Committee to oversee preparatory work, and various sub-groups detailed to examine issues pertinent to particular conferences. The National Telecommunications and Information Administration and the Federal Communications Commission participate fully in these activities, and other agencies are asked to attend to the extent their interests may be involved.

The OTA Report questions whether the Department's Office of International Communications Policy is able to prepare adequately for conferences and to make its influence felt. The Office's full participation in the IG which I chair, and the close liaison it now maintains with my office provide an assurance that it will influence policy development and implementation appropriately. Any deficiencies in regard to staffing will be addressed as required.

Finally, I would take exception to the assertion in the OTA Report that Executive Order 12046 has impeded Executive Branch consideration of telecommunications and information policy issues. Certainly it did not prove detrimental in preparations for, or negotiations at, the 1979 WARC. Nor does it appear to be impacting adversely on our preparations for future conferences. Such ambiguities as may be found can easily be resolved in the IG which brings together the principals affected by the Executive Order, including the Federal Communication Commission.

I welcome the interest you have shown in telecommunications and information policy, and am prepared to elaborate further on such aspects of our activities as you may wish.

Sincerely,

JAMES L. BUCKLEY.

Enclosure: National Preparatory Program for the 1985/1987 Space Services Conference.

DEPARTMENT OF STATE
Washington, D.C. 20520

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OFFICE OF INTERNATIONAL
COMMUNICATIONS POLICY

United States
NATIONAL PREPARATORY PROGRAM
for the ITU's
WORLD ADMINISTRATIVE RADIO CONFERENCE
on the Use of the
Geostationary Satellite Orbit
and Space Services
1985/1987

Prepared by:

Department of State
National Telecommunications and
Information Administration
Federal Communications Commission

January 1982

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United States

NATIONAL PREPARATORY PROGRAM
for the ITU's
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Note: This document has been prepared under the direction of the State Department Coordinating Committee for Future Radio Conferences, which is identified herein as Group B of the preparatory structure. Questions or comments regarding the National Preparatory Program contained in this document or any other aspects of the U.S. preparations for the Space WARC may be directed to one of the following:

- Gordon Huffcutt, Department of State, 632-2592
- Donald Jansky, NTIA, 724-3353
- Stephen Lukasik, FCC, 632-7060

SPACE WARC

U.S. PREPARATORY PROGRAM

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SPACE WARC

U.S. PREPARATORY PROGRAM

INTRODUCTION

In its Resolution No. 3 (BP), the World Administrative Radio Conference, Geneva, 1979, resolved "that a world administrative radio conference shall be convened not later than 1984 to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands allocated to the space services" to be held in two sessions. The ITU Administrative Council, at its 1981 session, has tentatively scheduled the two sessions to begin in July 1985 and September 1987 respectively. This conference will hereinafter be referred to as SPACE WARC. Further history and background information is provided in Attachment 1.

Many elements of the U.S. preparatory effort for SPACE WARC are already underway, as will be examined below, and must certainly continue. The purpose of this paper is to present an overall plan that will define, and assign to appropriate elements, every facet of the needed effort; identify the overall mechanism to provide the needed over-sight and guidance; lay out the necessary schedule of milestones; insure the adequate consideration of all appropriate concerns; weigh and rank appropriately all of the viable options; and culminate in a timely manner with the best possible set of U.S. objectives, proposals, positions, strategies, and delegation guidance. It is recognized from the outset that accomplishment of all the tasks set forth in this document will most likely be unnecessary in light of the agenda finally adopted. It is expected therefore that the actual scope of the preparatory effort will be modified periodically to take account of the final agenda, the resources available, and other factors which come to the attention of responsible officials.

TASKS TO BE PERFORMED

The wording of Resolution 3 is very general. In its title it refers to "the Geostationary-Satellite Orbit" and to "the space services utilizing it". In "resolves" 1, it refers to "the geostationary-satellite orbit and the frequency bands allocated to space services". In 3.1 it calls for the first session to "decide which space services and frequency bands should be planned". The definitive agenda has not yet been set by the Administrative Council with the required majority approval of ITU Members, and may not be set until after the 1982 Plenipotentiary Conference. It would appear, however, that the 1983 session of the Administrative Council would almost surely be the latest time for that action if the presently planned dates for the conference are not changed.

Efforts to develop an agenda must recognize that the allocation table contains fourteen space services in more than 150 primary table allocations, notwithstanding footnote and secondary allocations. The resources needed to examine detailed planning options for all space services/bands (primary, secondary, footnote allocations) would require resources far beyond those available to most administrations. Hence it is reasonable to expect that the agenda for the first session of SPACE WARC will provide some focusing of effort. This could entail the identification of specific services, bands and planning approaches to be investigated at the conference. Services subject to the greatest scrutiny regarding equitable access to the geostationary orbit have been the Broadcasting Satellite Service (BSS) and the Fixed Satellite Service (FSS). In planning the preparatory work, a broadbased effort addressing Resolution No. 3 (WARC 79) has been identified; however, within the specific tasks, emphasis will initially be placed on the FSS service.

It is impossible at this time to draw full assurance between the allocations of certain concern and those which can be ignored. Indeed, one of the principal tasks, which may remain significant right through the conference, is the development of the list of bands and services for which the existing procedures are adequate and the necessary rationale to support a conference decision in this regard. The tasks which support both the conference agenda development and overall preparatory efforts can be summarized as follows (see also, Attachment 2 for a more complete and detailed presentation):*

1. Band/Service Selection. For every space service allocation now appearing in Article 8 of the Radio Regulations, the set of reasonable and likely categories of space systems** that could utilize that allocation prior to the year 2005 should be identified. Identify those allocations which are not expected to have systems which use the geostationary-satellite orbit and give the rationale for such exclusion. For those bands/services which are expected to use the geostationary-satellite orbit (and thus are candidates for planning) develop information concerning US requirements and the appropriateness of the various planning options and alternatives to satisfy those requirements. This will allow work efforts to be focused and result in the assignment of priorities for the full development and evaluation of plannning options/alternatives for the list of bands/services. It is recognized that the Fixed-Satellite Service will initially be subject to the greatest attention and consideration.

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* As the agenda for the first session of SPACE WARC is developed, the preparatory efforts and priorities will be appropriately modified.

** Categories of systems are characterized by different uses and technical parameters in relation to other systems which may use the same band. For example, one category of sytem would be SCPC domestic service provided to a service area within a country. Category thus implies service, use and technical characteristics

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2. Planning Approach Development. For all identified services and bands the set of possible planning approaches including those that may be proposed by other administrations must be identified; each planning approach must be developed and the appropriate regulatory framework and principles identified within which the approach could be implemented. Each planning approach for each service and band should be analyzed and the associated advantages and disadvantages identified.

3. Technical. The constraints imposed by considerations of system performance, available and anticipated technology, intersystem and interservice sharing criteria, anticipated demand, anticipated system longevity, etc. must be developed. Necessary regulatory framework and sufficient language for intersystem and interservice sharing and coordination criteria must also be developed.

4. Economic. For each planning approach, service and band identified, perform an economic feasibility or cost-benefit analysis associated with the use of the geostationary-satellite orbit and the impact upon U.S. domestic and international trade.

5. Political. The political impact of each planning approach for each service and band and if appropriate, each category of system must be evaluated with respect to U.S. interests in light of world political considerations as reflected in such manifestations as the new world information order, the non-aligned movement, the peaceful uses of outer space, new international economic order, the orbit sovereignty claims of equatorial nations, etc.

6. Policy. The impact on each planning approach for each service and band and if appropriate, each category of system, must be examined for each existing U.S. Foreign and Domestic policy (e.g., open skies, competitive entry, reliance on the private sector, launch policy, free flow of information, human rights, prior consent, etc.). Requirements for new policy development should also be identified and appropriate policies developed and promulgated.

7. National Security. The potential impact, if any, of each category of system and each planning approach for each service and band on considerations of national security must be examined in light of both paroachial U.S. interests and existing world security alignments, commitments, treaties, and obligations.

8. Legal. The impact of each planning approach for each service and band and if appropriate, each category of system, on existing domestic and international law (e.g., the Communications Act, the Communications Satellite Act, etc.) must be evaluated. In the process, possible recisions, modifications or additions to U.S. law should be identified.

9. Evaluation. Taking into account inputs developed in Tasks 1-8, recommendations concerning the format and content of U.S. proposals and negotiating positions will be developed. This involves continuing overall evaluation of U.S. preparatory efforts to develop rankings for each planning approach for each selected space service and band.

10. Proposal Preparation. In light of decisions taken in Task 9 develop text of U.S. proposals and supporting documentation.

11. Avenues for Achievement. Simultaneously with the accomplishment of the above tasks, all appropriate avenues for achievement of the U.S. purpose must be both identified and actively pursued within an overall strategy. These avenues obviously include, but are not necessarily limited to:

    a. The CCIR.
    b. The Administrative Council.
    c. Intervening Administrative Radio Conferences.
    d. The Plenipotentiary Conference.
    e. The NATO Alliance.
    f. The Organization of American States, and CITEL.
    g. The United Nations and its existing committees and organizations (e.g., COPUOS, WMO, IMCO, ICAO, OECD, UNISPACE 82).
    h. International organizations (e.g., INTELSAT, INMARSAT).
    i. Any appropriate ITU or other symposia and seminars.
    j. Multilateral and Bilateral discussions.

ESSENTIAL PARTICIPANTS

From the above, it is obvious that appropriate inputs, reviews, participation, direction, guidance and awareness should be provided, as appropriate, by:

The Department of State
The National Telecommunications and Information Administration
The Federal Communications Commission

The National Security Council and other Appropriate
elements of the Executive Office of the President
Member Agencies of the IRAC
The U.S. CCIR Community
The Telecommunications Operating Companies
The Telecommunications Manufacturing Companies
The Public Interest Sector
The User Community

As was noted above, certain of these participants are already actively involved; the U.S. CCIR community (through Ad Hoc 4/1 and the actions of other study groups to provide appropriate input); the spectrum management community (through IRAC Ad Hoc 178 and therein, the spectrum management interest of the concerned Federal Departments and Agencies and the Federal Communications Commission); the Federal Communications Commission (through the formation of its internal committee, its advisory committee and the release of its first NOI in general docket 80-741, with others to come); and such operating, manufacturing, user, and public interest parties who have responded to the first NOI.

Also needed, however, is the participation of the policy making, long range planning, and operational elements of the Federal Agencies; the NSC; economic and trade interests; and the balance of the public sector representatives.

PREPARATORY STRUCTURE

The preparatory structure required for SPACE WARC consists of various elements as follows:

A. Senior Level Interagency Committee
B. Coordinating Committee for Future Radio Conferences
C. FCC SPACE WARC Preparatory Committee
D. NTIA/IRAC (AH-178)
E. US CCIR Ad Hoc Group (Presently Ad Hoc 4/1)
F. FCC SPACE WARC Advisory Committee
G. Economic Evaluation Group
H. Political Evaluation Group
I. National Security Evaluation Group
J. Legal Evaluation Group

Because of differences in viewpoint, function, make-up, tasks to be assigned, and the desirability of keeping each of these separate and clearly defined, these ten elements are separately constituted even though many of the individuals involved will necessarily serve on more than one element. The function and make-up of each element is briefly described as follows (see also, Attachment 3 for detail of task assignments and Attachment 4 which gives the schedule for completing the assignments):

A - Senior Level Interagency Committee

Broad policy direction, review of major options and alternatives, and final decisions as to U.S. proposals and positions will be provided by the senior level Interagency Committee (IC).

The IC provides a continuing senior level, interagency coordination mechanism for all activities and policies relating to international communications and information matters, including ITU radio conferences. The Committee meets quarterly to review and discuss current issues and carries out its work by correspondence and telephone between meetings.

Membership on the Interagency Committee is as follows:

Chairman - Under Secretary of State for Security Assistance, Science and Technology (T)
Assistant Secretary of Commerce for Communications and Information
Chairman, Federal Communications Commission
Deputy Under Secretary of Defense (CCCI)
Office of the U.S. Trade Representative
Deputy Administrator, Office of Management and Budget
Office of the National Security Council
Deputy Director, Office of Policy Development, The White House
Assistant Director, International Communications Agency
Office of Science and Technology Policy
National Aeronautics and Space Administration
Chairman, Board for International Broadcasting
Administrator, Agency for International Development

B - Coordinating Committee for Future Radio Conferences

Preparation of matters for the IC's consideration in carrying out the day-to-day management of conference preparatory activities will be provided by the State Department Coordinating Committee for Future Radio Conferences. The Committee, established in June 1980 to coordinate U.S. preparations for the several upcoming ITU radio conferences, consists of senior level staff of State, NTIA and the FCC. It normally meets each month to review, discuss and make decisions as appropriate on matters dealing with or related to radio conference activities, and carries out its work through frequent telephone and personal contact between meetings. Other agencies or individuals will be invited to participate as required.

The specific tasks for SPACE WARC preparations include the following:

1. to oversee and coordinate the overall U.S. preparatory effort;
2. to identify and assign task assignments, and establish priorities and completion dates;
3. to provide specific guidance and direction to all of the lower elements of the preparatory structure;
4. to carry out a detailed review of the results of all other tasks and recommend an overall ranking of options with pros and cons;
5. to keep the Interagency Committee informed of activities and progress, and submit necessary action items for IC approval in a timely manner;
6. to consider, develop and carry out an appropriate strategy in regard to U.S. preparations for and participation in the SPACE WARC;
7. to coordinate and ensure proper U.S. involvement in all activities and events listed in Task 11 (Avenues for Achievement).

C - FCC SPACE WARC Preparatory Committee

This is an internal FCC group consisting of representatives from all affected bureaus and offices within the Commission, namely Office of General Counsel, Office of Plans and Policy, Common Carrier Bureau, Broadcast Bureau, Private Radio Bureau, Field Operations Bureau, Chairman's Office (International Affairs Advisor) and is chaired by the Office of Science and Technology.

This group should develop any necessary Notices of Inquiry, evaluate all comments received, provide all tasking to, and receive all outputs from, the FCC Advisory Committee described below and, when the time arrives, help draft proposals and position papers and develop the Final Report and Order. In summary, it should accomplish with regard to all non-government interests, the development of Tasks 1, 2 and 3 and should prepare inputs with respect to Tasks 4, 5 and 6.

D - NTIA Interdepartment Radio Advisory Committee (IRAC AH 178)

IRAC is an advisory committee which provides guidance to NTIA on spectrum management matters. IRAC consists of representatives from all Federal agencies that have requirements for use of the electromagnetic spectrum. Within IRAC, AH-178 has been established to carry out preparations necessary for participation in the Space Services WARC. This group should do all of Task 1, 2 and 3 with regard to government interests and, should prepare inputs with respect to Tasks 4, 5 and 6. AH-178 will provide inputs through the IRAC to NTIA to allow the development of positions and proposals regarding Federal Government interests. These inputs will be used by NTIA in carrying out its overall SPACE WARC preparatory responsibilities and support the development of proposals, position papers and delegation guidance.

E - US CCIR Ad Hoc Group

The US CCIR organization prepares for and participates in ITU CCIR meetings as an advisory committee to the Department of State. A US CCIR Ad Hoc group (presently Ad Hoc 4/1) has been established and consists of appropriate experts for space services and terrestrial services. This group may change from its present Ad Hoc 4/1 structure. This group should accomplish all of Tasks 2 and 3 relying on IRAC AH-178 and the FCC SPACE WARC Preparatory Committee for the necessary inputs.

F - FCC SPACE WARC Advisory Committee

This committee was established by the FCC on August 4, 1981, through the release of a Memorandum of Opinion and Order with representation from the space and terrestrial communications operating and manufacturing companies, users, and from the public interest sector and is charged with providing inputs to the FCC staff to support the development of Tasks 1 through 6 and 8.

G - Economic Evaluation Group

This is a new group to be formed to accomplish Task 4. It should have representation from the U.S. Trade Representative, the Trade Offices within the Departments of Commerce and State, NTIA's Office of International Affairs, the FCC's Office of Plans and Policy (which member would be supported in Task 4 by the recommendations of the FCC Advisory Committee), Director of Defense Research and Engineering, and NASA's Associate Administrator for Applications.

H - Political Evaluation Group

This is a new group to be formed to accomplish Task 5. It should be chaired by a representative of the Department of State and should have representation from appropriate offices in State, ICA, FCC and NTIA.

I - National Security Evaluation Group

This is a new group to be formed to accomplish Task 7. It should be comprised of representatives from the Executive Office of the President, State, NTIA, Defense, CIA and any other agencies having an advisory role in national security matters.

J - Legal Evaluation Group

This is a new group to be formed to accomplish Task 8. It should have representation from the Legal Counsels of State, FCC, NTIA, DoD, and NASA.

Attachment 1

HISTORY AND BACKGROUND

The Extraordinary Administrative Radio Conference, Geneva, 1963, established the basic philosophy of the current regulatory procedures related to space telecommunications, particularly for those space systems utilizing the geostationary satellite orbit/spectrum. Although modified by the WARC for Space Telecommunications, Geneva, 1971, and by the WARC-79 this philosophy is embodied in the current advance publication, coordination and notification procedures of the Radio Regulations.

As early as the 1971 WARC there was concern on the part of some nations that saturation of the orbit capacity might occur long before many nations had achieved the economic and technical capability to establish space systems. A resolution proposed by Mexico calling for allotment to nations of orbital positions was only withdrawn at the Final Plenary. In 1973 at the Malaga-Torremolinos Plenipotentiary Conference, there were proposals to insert in the Convention words which would have given the IFRB authority to assign orbital positions. Diligent and difficult negotiations were required to achieve the present Convention language which empowers the IFRB to make an orderly recording of the positions assigned by countries to geostationary satellites. Provision 131 in Article 33 of the Convention was inserted which provides that:

> "In using frequency bands for space radio services Members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of the Radio Regulations according to their needs and the technical facilities at their disposal."

Since the adoption of the existing principles and related regulatory provisions, many countries have availed themselves of the orbit/spectrum resource. Recently, however, it has proved somewhat more difficult, in terms of coordination efforts, than in earlier days to complete the process because of the increasing number of systems operating on the orbit. Consequently, concerns were raised prior to and at the WARC-79 on the equitability of the current provisions, which seem to favor those administrations which notify earlier. In fact, many countries at the WARC-79 favored adoption of some form of formal plans to govern implementation of geostationary space systems.

This led directly to the adoption of Recommendation No. 12 which recommends to the Administrative Council, and, as appropriate, to the ITU Plenipotentiary Conference, the inclusion in the program of future conferences of a "World Administrative Radio Conference on the Use of the Geostationary-Satellite Orbit and the Planning of Space Services Utilizing it (See Resolution 3)". The 36th Session of the ITU Administrative Council held in June 1981 decided to recommend to the 1982 Plenipotentiary Conference that the first session of SPACE WARC should be held for six weeks beginning in July 1985 and the second session of this conference should be held for six weeks beginning in September of 1987. In addition the 1981 Administrative Council identified the need for seminars in the period January through April 1985. The agenda for these conference sessions is still to be set.

Resolution No. 3, however, provides that the first session of the conference will:

1) decide which space services and frequency bands should be planned and establish the principles and criteria for planning;

2) establish guidelines for regulatory procedures for those services and bands where planning is not appropriate;

3) consider other possible approaches that will accomplish the objective of guaranteeing equitable access to the resource.

The second session of the conference will implement the decisions of the first session.

Resolution 3 and Recommendation 12 of WARC-79 and a list of future conferences are provided as Appendices 1, 2 and 3 respectively.

The U.S. is thus faced with the challenging task of adequately preparing for SPACE WARC, by far the most important and comprehensive conference ever to affect space telecommunications.

U.S. preparatory efforts for past Administrative Radio Conferences have always, and quite properly, varied depending on the agenda and scope of the conference. Over recent years there has been an increasing awareness outside of the U.S. domestic and international telecommunications spectrum management arena (FCC/NTIA/STATE) of the importance and impact of ITU administrative conferences. Senators Barry Goldwater and Harrison Schmitt and Congressmen Dante Fascell and Timothy Wirth have made public expressions of their interest and concern. Those concerned with telecommunication policy, political, economic, trade, and public interest aspects also have concerns that must be adequately addressed in the overall preparatory program.

The International Radio Consultative Committee (CCIR) of the ITU has already established several groups which have been conducting efforts to examine the efficient utilization of the geostationary satellite orbit. At the present time, an Interim Working Party (IWP 4/1) under its Study Group 4 is the focal point for all CCIR SPACE WARC preparatory efforts. The CCIR XVth Plenary Assembly (February 1982) is expected to approve a revised terms of reference (see appendix 4 which contains the IWP PLEN/1 recommendation concerning the revision of Resolution 24-4 on the organization of the CCIR) under which a group other than IWP 4/1 may become the new focal point for CCIR SPACE WARC preparations. One possibility is the establishment of a special preparatory meeting which would be tasked with bringing together the efforts all CCIR Study Groups with an interest in SPACE WARC.

As mentioned earlier the National Telecommunications and Information Administration (NTIA), Interdepartment Radio Advisory Committee (IRAC) has established AH 178 (terms of reference in Appendix 5) to provide the focus within the Federal Government's spectrum management community for SPACE WARC preparations.

The Federal Communications Commission (FCC) in addition to providing a liaison representative to the IRAC and to its AH 178) has formed a SPACE WARC Preparatory Committee and has already released one Notice of Inquiry (NOI) under general docket number 80-741 in preparation for SPACE WARC. One item, briefly treated in the 1st NOI~~,~~ and further treated in a Memorandum Opinion and Order adopted on July 16, 1981, is the establishment of an Advisory Committee to provide public sector input in support of its deliberations.

BP

RESOLUTION No. 3

Relating to the Use of the Geostationary-Satellite Orbit and to the Planning of Space Services Utilizing It

The World Administrative Radio Conference, Geneva, 1979,

considering

a) that the geostationary-satellite orbit and the radio frequency spectrum are limited natural resources and are utilized by space services;

b) that there is a need for equitable access to, and efficient and economical use of, these resources by all countries as provided for in Article 33 of the International Telecommunication Convention (Malaga-Torremolinos, 1973) and Resolution 2;

c) that the utilization of radio frequencies and the geostationary-satellite orbit by individual countries and groups of countries can take place at various points in time, based on their requirements and the availability of the resources at their disposal;

d) that there are growing requirements all over the world for orbital position and frequency assignments for the space services;

e) that in the use of the geostationary-satellite orbit for space services, attention should be given to the relevant technical aspects concerning the special geographical situation of particular countries;

resolves

1. that a world space administrative radio conference shall be convened not later than 1984 to guarantee in practice for all countries equitable access to the geostationary-satellite orbit and the frequency bands allocated to space services;

2. that this conference shall be held in two sessions;

3. that the first session shall:

   3.1 decide which space services and frequency bands should be planned;

   3.2 establish the principles, technical parameters and criteria for the planning, including those for orbit and frequency assignments of the space services and frequency bands identified as per paragraph 3.1, taking into account the relevant technical aspects concerning the special geographical situation of particular countries; and provide guidelines for associated regulatory procedures;

   3.3 establish guidelines for regulatory procedures in respect of services and frequency bands not covered by paragraph 3.2;

   3.4 consider other possible approaches that could meet the objective of *resolves* 1;

4. that the second session shall be held not sooner than twelve months and not later than eighteen months after the first session and implement the decisions taken at the first session;

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invites

1. *the CCIR* to carry out preparatory studies and provide the first session of the conference with technical information concerning principles, criteria and technical parameters including those required for planning space services;

2. *the IFRB* to prepare a report on the operation of the procedures of Articles 11 and 13 including information about difficulties which may be reported to the IFRB by administrations in gaining access to suitable orbital locations and frequencies, and to circulate this report to administrations at least one year before the first session of the conference;

3. *the IFRB* to carry out technical preparations for the conference in accordance with the provisions of the Radio Regulations;

4. *the administrations* to examine all aspects of the matter with a view to submitting proposals to the conference, and to cooperate actively in the above-mentioned work of the CCIR and IFRB;

5. *the Administrative Council* to take all necessary steps for the convening of the conference in accordance with this Resolution.

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Appendix 2 to
Attachment 1

XM

RECOMMENDATION No. 12

Relating to the Convening of Future Administrative Radio Conferences to Deal with Specific Services

The World Administrative Radio Conference, Geneva, 1979,

noting

a) that item 2.10 of its terms of reference calls on the Conference to propose to the Administrative Council and to the Plenipotentiary Conference a programme for the convening of future administrative radio conferences to deal with specific services;

b) that several Resolutions and Recommendations of this Conference call for, or refer to, the convening of such future conferences;

considering

a) that, in drawing up a programme of future world administrative radio conferences, account needs to be taken of other conferences involving Members of the Union, including regional and sub-regional conferences, the Plenipotentiary Conference, and the meetings of the CCIR;

b) that conferences need to be spaced out sufficiently to allow adequate time for preparation for each conference by administrations and by the permanent organs of the Union;

c) that a number of individual subjects raised in the Resolutions and Recommendations referred to in *noting b)* should be treated by a competent conference and that it will be for the Administrative Council to take the necessary action at the appropriate time for each matter concerned to be included in the agenda of such a conference;

recommends the Administrative Council and, as appropriate, the Plenipotentiary Conference

1. to include the following world administrative radio conferences in the programme of future conferences:
   - world administrative radio conference for the mobile services (see Resolution 202);
   - world administrative radio conference for the planning of the HF bands allocated to the broadcasting service (see Resolution 508 and Recommendations 500 and 501);
   - world administrative radio conference on the use of the geostationary-satellite orbit and the planning of space services utilizing it (see Resolution 3);

BEST COPY AVAILABLE

2. to include the following regional administrative radio conferences, some of which are already arranged, in the programme of future conferences:

- final session, Region 2, medium frequency broadcasting conference (already arranged for November 1981);
- Region 2 broadcasting-satellite planning conference (already arranged for the second quarter of 1983 – see Resolution 701);
- planning conference for sound broadcasting in the band 87.5 - 108 MHz for Region 1 and certain countries concerned in Region 3 (see Resolution 510);
- conference to draw up agreements and associated plans for feeder links to broadcasting satellites operating in the 12 GHz band in Regions 1 and 3 (see Resolution 101);
- regional administrative radio conference to establish criteria for the shared use of the VHF and UHF bands allocated to fixed, broadcasting and mobile services in Region 3 (see Resolution 702);
- conference to revise the Plan annexed to the Copenhagen Convention, 1948, for the European Maritime Area – Region 1 (see also Recommendation 300 on this subject);
- conference to review and revise the provisions of the Final Acts of the African VHF/UHF Broadcasting Conference, Geneva, 1963 (see Resolution 509);
- planning conference for broadcasting in the band 1 605 - 1 705 kHz in Region 2 (see Recommendation 504);

3. to take the necessary steps to convene each of these conferences as soon as practicable after the completion, in each case, of the necessary preparatory work, bearing in mind:

a) the timing of the conferences, as expressed in the Recommendations and Resolutions mentioned in *recommends* 1 and 2;

b) the need for the conferences to be adequately spaced so as to allow administrations and the permanent organs of the Union adequate time for preparation;

c) the programme of planned or foreseen conferences, other than administrative radio conferences, involving Members of the Union;

d) the resources which will need to be devoted by individual administrations and by the Union as a whole to the completion of this programme of conferences.

Appendix 3 to
Attachment 1

UNION INTERNATIONALE DES TELECOMMUNICATIONS
INTERNATIONAL TELECOMMUNICATION UNION
UNIÓN INTERNACIONAL DE TELECOMUNICACIONES

Place des Nations
CH 1211 Genève 20 | Téléphone National (022) 99 51 11
International +41 22 99 51 11 | Tg: BURINTERNA GENEVE
Télex 421 000 UIT CH | TELEFAX (groupe 2)
+41 22 33 72 56

SECRÉTARIAT GÉNÉRAL

Genève, le 19 October 1981

Référence à rappeler dans la réponse
When replying, please quote
Indíquese en la respuesta esta referencia | N° Circular letter No. 439
RM/M/WARC-84

Tél

To the Director-General

Dear Sir,

As announced in Circular telegram No. A335 of 9 June 1981 and in Notification No. 1164 of 10 July 1981, the ITU Administrative Council at its 36th Session (June 1981) amended the timetable of conferences and meetings established by the 35th Session. For ease of reference and comparison as may be required, I am enclosing a copy of both timetables (Annexes 1 and 2).

You will also find enclosed (Annex 3) a draft Resolution by the Administrative Council concerning the World Administrative Radio Conference for the Planning of HF Bands allocated to the Broadcasting Service, the first and second sessions of which are scheduled for January-February 1984 and January-February 1986, respectively.

The Administrative Council decided to submit this draft Resolution to the Members of the Union for comment and to reconsider it at its 37th Session in the light of the replies received.

As indicated in the footnote relating to item 3.2.1 of the proposed agenda for the Conference, a summary record of the discussion of this item in the Council is also enclosed (Annex 4).

I should be grateful if you would let me have your comments on the draft Resolution in Annex 3 by 15 January 1982.

Yours faithfully,

For the Secretary-General,

R.E. BUTLER
Deputy Secretary-General

Annexes : 4

1-9

ANNEX 2

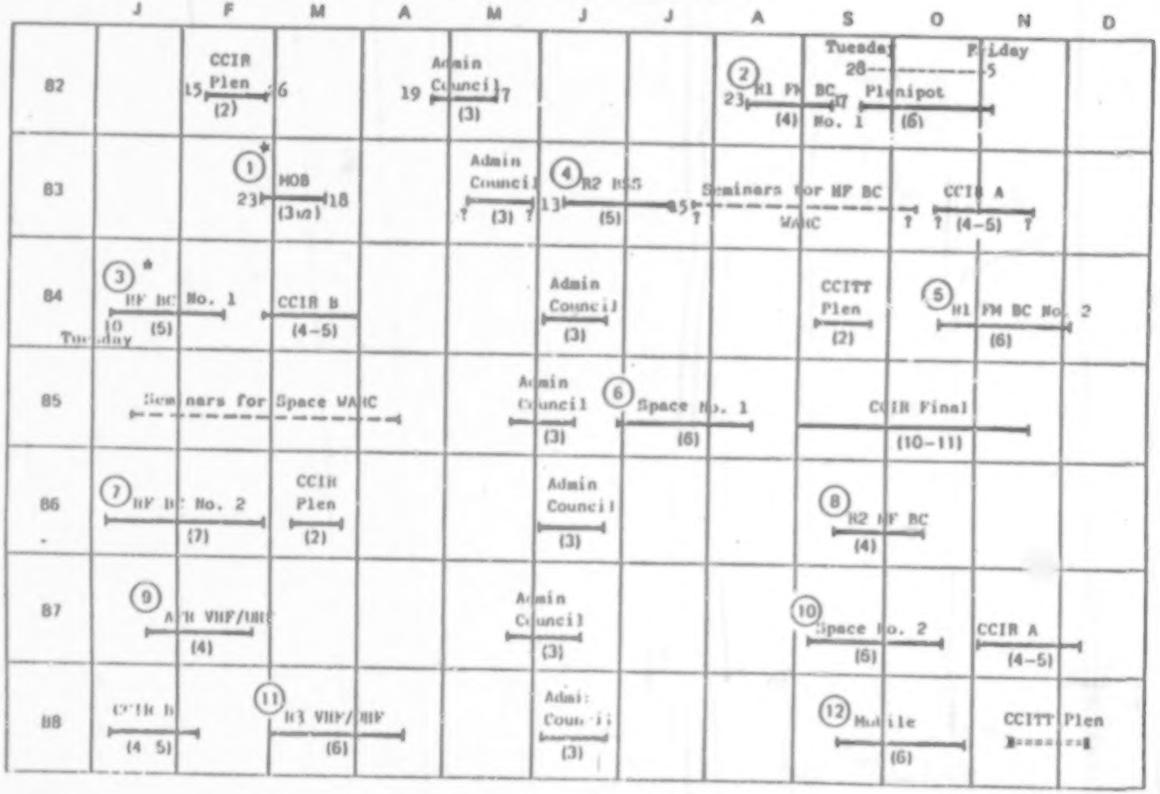
○ = Order of Conference

* = Out of 1980 order

( ) = Approx. weeks duration

TIMETABLE OF FUTURE CONFERENCES AS ESTABLISHED

AT 36th SESSION OF COUNCIL IN 1981



KEY TO ABBREVIATIONS USED IN ANNEX 2

CCIR Plen	CCIR XVth Plenary Assembly, Geneva, 15 - 26 February 1982
Admin Council	37th Session, Administrative Council, 19 April-7 May 1982
R1 FM BC No. 1	1st Session for technical preparation, Regional Administrative Conference for FM sound broadcasting in the VHF band (Region 1 and certain countries concerned in Region 3), Geneva, 23 August-17 September 1982
Plenipot	Plenipotentiary Conference, Nairobi, Kenya, Tuesday, 28 September-5 November 1982
MOB	World Administrative Radio Conference for Mobile Telecommunications confined to matters considered to be of priority specially safety and distress aspects, Geneva, 23 February-18 March 1983
Admin Council	38th Session, Administrative Council, May, 1983
R2 BSS	Regional Administrative Radio Conference for the planning of the Broadcasting-Satellite Service in Region 2, 13 June-15 July 1983
Seminars for HF BC WARC	Seminars to prepare for 1st Session of WARC for the planning of HF bands allocated to the Broadcasting Service to be held July-October, 1983
CCIR A	CCIR Interim Study Group Meetings, Series A, 4-5 weeks, October-November 1983
HF BC No. 1	1st Session of World Administrative Radio Conferences for the planning of HF bands allocated to the Broadcasting Service, starting Tuesday, 10 January 1984, for five weeks
CCIR B	CCIR Interim Study Group Meetings, Series B, 4-5 weeks, February-March 1984
Admin Council	39th Session, Administrative Council, June 1984, 3 weeks
CCITT Plen	CCITT VIIIth Plenary Assembly, September 1984, two weeks
R1 FM BC No. 2	2nd Session of Planning Conference for Sound Broadcasting in the band 87.5 - 108 MHz for Region 1 and certain countries concerned in Region 3, mid-October to beginning December 1984, 6 weeks
Seminars for Space WARC	Seminars to prepare for 1st Session of WARC on the use of the Geostationary-Satellite Orbit and the planning of Space Services utilizing it, mid-January-mid April, 1985
Admin Council	40th Session, Administrative Council, end May-mid June 1985

Space No. 1	1st Session of World Administrative Radio Conference on the use of the Geostationary-Satellite Orbit and the planning of Space Services utilizing it, end June-mid August 1985, 6 weeks
CCIR Final	CCIR Final Study Group Meetings, 10-11 weeks, September-mid November, 1985
HF BC No. 2	2nd Session of WARC for the planning of HF bands allocated to the Broadcasting Service, early January-end February 1986, 7 weeks
CCIR Plen	CCIR XVIth Plenary Assembly, March 1986, 2 weeks
Admin Council	41st Session, Administrative Council, June 1986, 3 weeks
R2 MF BC	Planning Conference for the Broadcasting Service in the band 1605 - 1705 kHz in Region 2, mid-September to mid-October 1986, 4 weeks
AFR VHF/UHF	Conference to review and revise the provisions of the Final Acts of the African VHF/UHF Broadcasting Conference, Geneva 1963, mid-January to February 1987, 4 weeks
Admin Council	42nd Session, Administrative Council, end May-June 1987, 3 weeks
Space No. 2	2nd Session of WARC on the use of the Geostationary-Satellite Orbit and the planning of Space Services utilizing it, September-October 1987, 6 weeks
CCIR A	CCIR Interim Study Group Meetings, Series A, November-December 1987, 4-5 weeks
CCIR B	CCIR Interim Study Group Meetings, Series B, January-February 1988, 4-5 weeks
R3 VHF/UHF	Conference to establish criteria for the shared use of the VHF and UHF bands allocated to Fixed, Broadcasting and Mobile Services in Region 3, March-mid April 1988, 6 weeks
Admin Council	43rd Session, Administrative Council, June 1988, 3 weeks
Mobile	World Administrative Radio Conference for the Mobile Services, mid-September to October 1988, 6 weeks
CCITT Plen	CCITT IXth Plenary Assembly, November-December 1988, 2 weeks

Appendix 4 to
Attachment 1

IWP PLEN/1 Recommendation
Concerning Resolution 24-4
on The Organization of the
CCIR

6. CCIR Preparations for Administrative Radio Conferences

Considering the different requirements between preparations for ARCs and the normal continuing work of the Study Groups.

6.1 Special preparatory work for an ARC shall only be undertaken by CCIR at the invitation of (i) a plenipotentiary conference, or
(ii) an administrative radio conference, or
(iii) the Administrative Council

6.2 Following an invitation from any of the three bodies mentioned above, the Director of the CCIR shall consult the Chairmen of the Study Groups concerned to determine the precise form of the preparatory work required to respond to the invitation. He shall inform all Study Group Chairmen and Vice-Chairmen of the proposed action, and in due course all administrations of the Union of the agreed working programme for preparing the technical and operational bases for the ARC.

6.3 The preparatory work shall be carried out by CONFERENCE PREPARATORY MEETINGS which will comprise one or more Study Groups. Where more than one Study Group is involved, the CONFERENCE PREPARATORY MEETINGS will in effect be Joint Meetings of Study Groups. The authority and integrity of the Study Group as an approval body for the Report are thus retained.

6.4 The CONFERENCE PREPARATORY MEETING, which may be convened more than once if required, may establish CONFERENCE PREPARATORY WORKING GROUPS during its sessions. The CONFERENCE PREPARATORY MEETING has to consider and approve the Report to the ARC on behalf of the Study Groups involved.

6.5 The Chairman of the CONFERENCE PREPARATORY MEETING shall be, in principle, the Chairman of the Study Group with the primary interest in the preparations. The Chairmen of any necessary CONFERENCE PREPARATORY WORKING GROUPS shall be proposed by the Chairman of the CONFERENCE PREPARATORY MEETING and be approved by the meeting.

6.6 The procedures set forth in § 6.2 to 6.5 inclusive shall be completed as soon as possible after an invitation is received.

Appendix 5 to
Attachment 1

R INFORMATION

Doc. 21464/1-1.9.178
UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
INTERDEPARTMENT RADIO ADVISORY COMMITTEE
Washington, D.C. 20230

Address all communications
to The Executive Secretary

Date: June 11, 1980

Subject: Establishment of Ad Hoc 178 - Space Services WARC

To: Members, IRAC

The IRAC, on March 11, 1980, established Ad Hoc 178.

The following terms of reference were approved:

> "To carry out preparations necessary for effective U. S. participation in scheduled ITU Administrative Radio Conferences and to recommend U. S. positions for such conferences."

NTIA (Urbany) was named Convener with designated members from Army (Phillips/Blackwell), DOE (Clepper/Lemme), FAA (Johnson), FCC (Tycz/Jabobs), NASA (Kimball/Miller), Navy (Feigleson), NSF (Pankonin) and NSA (McConnell).

Virginia R. Wightman
for Edwin E. Dinkle
Executive Secretary

ATTACHMENT 2

DETAILED DESCRIPTION OF TASKS

Task 1: Identification of Space Services and Bands of Concern

a. Identify all space service allocations appearing in Article 8.

   1) Postulate all reasonable and likely categories of space services that could utilize each accommodation by the year 2005.

   2) Select those that might use geostationary satellites.

   3) For any service and band eliminated, develop full rationale.

b. For each service and band selected, identify as follows:

   1) Those in which only domestic services are likely.

   2) Those in which both domestic and regional or international services are likely.

   3) Those in which only regional or international services are likely. There should be greater acceptance of some flexibility in planning for these services and bands. Of these, further evaluate as to whether or not a single organization might better handle the planning (e.g., INMARSAT, the WMO, ICAO, etc.) within the context of the ITU regulatory framework.

c. Identify all services and bands in order of likely greatest concern at SPACE WARC providing full rationale for decisions regarding prospects for planning.

Task 2: Development and Evaluation of Planning Approaches

a. Considering all services and bands identified under Task 1 develop possible planning methods which may be considered by the WARC. These methods include, but are not limited to, those identified in the report of CCIR IWP 4/1 and those identified in response to FCC NOI's.

b. Develop planning principles and evaluation criteria for determining the advantages and disadvantages of the methods identified in 2a above.

c. Apply the planning methods and evaluation criteria to the bands and services considered in Task 1 and indicate the adequacy of various planning methods to satisfy U.S. requirements.

d. For the planning methods determined to be feasible in 2c above develop the necessary regulatory framework required to implement such planning methods.

e. Develop any manual or automated techniques and inputs required to support and implement the planning methods identified in 2d above.

Task 3: Technical Factors

a. For each service and band identify whether the allocation is exclusive or shared and, if shared, identify the sharing service(s).

b. Using the categories of systems postulated under Task 1 and typical systems where terrestrial services are involved, determine any necessary constraints imposed by intersystem and interservice sharing, postulating the extremes of available and anticipated technology, anticipated service demand, anticipated system longevity, etc.

c. Evaluate the planning methods developed in Task 2a, in the light of the constraints developed in 3b above providing recommendations regarding the appropriateness of the various methods based upon technical factors.

d. For the full matrix of services and bands and planning methods, develop the draft regulatory language that would be required to impose the necessary technical constraints for each planning method (e.g., sharing criteria, PFD limits, antenna pointing, station keeping, carrier dispersion, etc.).

Task 4: Economic Factors

a. For each service and band planning method developed in Task 2a perform a first cut economic feasibility or cost-benefit analysis.

b. Evaluate the potential impact of each service and band and planning method on the U.S. posture in the world trade arena.

c. Evaluate the planning methods developed in 2a in the light of economic considerations providing recommendations regarding the appropriateness of the various methods based on economic factors.

Task 5: Political Factors

a. For each service and band and planning method developed in Task 2a, and if appropriate, each category of system postulated in Task 1, evaluate the political impact as reflected in such manifestations as the New World Information Order, the New International Economic Order, the non-aligned movement, the peaceful uses of outer space, the Bogota declaration, etc.

b. Evaluate the planning methods developed in Task 2a in the light of political considerations providing recommendations regarding the appropriateness of the various methods based on political factors.

Task 6: Policy Factors

a. For each service and band and planning method developed in Task 2a, and if appropriate, each category of system postulated in Task 1, evaluate the impact, if any, of existing U.S. domestic and foreign policy (e.g., open skies, competetive entry, reliance on the private sector, launch policy, free flow of information, prior consent, human rights, etc.) and the need, if any, for new or modified policy.

b. Evaluate the service and band and planning methods developed in Task 2a in the light of policy considerations providing recommendations regarding the appropriateness of the various methods based on policy factors.

c. As appropriate, prepare draft language for any new, or modifications of existing, policy statements.

Task 7: National Security Factors

a. For each service and band and planning method developed in Task 2a, and if appropriate, each category of system postulated in Task 1, evaluate the impact of national security considerations in the light of U.S. interests including existing world security alignments, commitments, treaties, and obligations.

b. Evaluate the service and band and planning methods developed in Task 2a in the light of national security considerations providing recommendations regarding the appropriateness of the various methods based on national security factors.

Task 8: Legal Factors

a. For each service and band and planning method developed in Task 2a, and, if appropriate, each category of system postulated in Task 1, evaluate the impact on existing law (e.g., the Communications Act of 1934, the Communications Satellite Act of 1962, etc.) and/or the need, if any, for new or modified law.

b. Evaluate the service and band and planning methods developed in Task 2a in the light of legal considerations providing recommendations regarding the appropriateness of the various methods based on legal aspects.

c. As appropriate, prepare draft language for any new, or modification of existing law.

Task 9: Proposal Evaluation

Conduct continuing overall evaluation of U.S. preparatory efforts taking into account inputs developed in Tasks 1-8. This process would identify the format and content of U.S. proposals.

Task 10: Proposal Preparation

In light of decisions taken in Task 9 develop text of U.S. proposals and supporting documentation.

Task 11: Avenues for Achievement

Throughout all stages of the ten (10) Tasks listed above, constant monitoring of the developing U.S. position must be maintained and appropriate positions and guidance must be developed for use as:

a. Inputs to the various interim and final study group meetings, interim working party meetings, and plenary assemblies of the International Radio Consultative Committee (CCIR).

b. U.S. proposals and positions for the annual meetings of the Administrative Council of the ITU.

c. Proposals, delegation positions, or instructions for delegation informal contacts and discussions, as appropriate, for use at any or all intervening world and regional administrative conferences of the ITU.

d. Proposals, delegation positions, or instructions for delegation informal contacts and discussions, as appropriate, for use at the 1982 Plenipotentiary Conference of the ITU.

e. Proposals, delegation positions, or instructions for delegation informal contacts and discussions, as appropriate, for use at all permanent working group, special working group, full military, or joint civil/military meetings of the Allied Radio Frequency Agency (ARFA) of NATO.

f. Proposals, delegation positions, or instructions for delegation informal contacts and discussions, as appropriate, for use at all meetings of Interamerican Telecommunications Conference (CITEL) or any of its permanent technical committees.

g. Proposals, delegation positions, or instructions for delegation informal contacts and discussions, as appropriate, for use at:

   1) The Second U.N. Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE 82).

   2) Meetings of the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS) or its subcommittees.

   3) The World Meteorological Organization.

   4) Meetings on Facilities Planning.

   5) Meetings of the International Bureau of Informatics.

   6) Any other targets of opportunity.

h. Positions for use in bilateral and multilateral discussions, which must also be planned, arranged and conducted.

i. Papers to be presented at, or informal discussions to be conducted at, any IFRB, ITU, or other appropriate symposia.

TASK ASSIGNMENTS

Tasks	Preparatory Elements Senior Level Interagency Committee A	Coordinating Committe For Future Radio Conferences B	FCC SPACE WARC Preparatory Committee C	Interdepartment Radio Advisory Committee (Ad Hoc 178) D	U.S. CCIR Ad Hoc 4/1 E	FCC Advisory Committee F	Economic Evaluation Group G	Political Evaluation Group H	National Security Evaluation Group I	Legal Evaluation Group J
Band/Service Selection 1		US	NG	G		NG In				
Planning Approach Selection 2		US	US NG	G	US in	NG In				
Technical Factors 3			US NG	G	US in	NG In				
Economic Factors 4			NG In	G In		NG In	US In			
Political Factors 5	US		NG In	G In		NG In		US In		
Policy Factors 6	US		NG In	G In		NG In				
National Security Factors 7	US								US In	
Legal Factors 8	US					NG in				US In
US Proposals (Evaluation) 9		US In	NG in	G in						
US Proposal Preparation 10	US	US in								
Avenues for Achievement 11		US								

G Will accomplish the task for Government interests
NG Will accomplish the task for Non-Government interests
US Will accomplish the task for all U.S. interests
In Will provide input recommendations as indicated

ATTACHMENT 4

SCHEDULING OF EFFORT

The following schedule details the completion of task assignments by the groups involved in preparatory efforts.

Appendix 1 is a representation in milestone chart form of the following schedule of effort.

1981

1 Oct	Establishment of Coordinating Committee (For Future Radio Conferences) (Group B) which begins work on Avenues for Achievement (Task 11). FCC SPACE WARC Preparatory Committee (C) already exists. Augment the IRAC Ad Hoc 178 (D) to enlarged membership. Augment the U.S. CCIR Ad Hoc 4/1 Group (E) to add terrestrial service experts and experts for other space services.
5 Oct	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) begin work on inputs for Band/Service Selection (Task 1), Planning Approach Selection (Task 2), and Technical Factors (Task 3); U.S. CCIR Ad Hoc 4/1 (E) begins work on Planning Approach Selection (Task 2) and Technical Considerations (Task 3).
1 Nov	FCC Advisory Committee (F) already exists.
15 Nov	FCC Advisory Committee (F) begins work on inputs for Band/Service Selection (Task 1), Planning Approach Selection (Task 2), Technical Factors (Task 3), Economic Factors (Task 4), Political Factors (Task 5), Policy Factors (Task 6), and Legal Factors (Task 8).
1 Dec	The Senior Level Interagency Committee (A) already exists.

1982	
1 Jan	Coordinating Committee (B) begins work on U.S. Proposals (Evaluation) (Task 9).
	Initial guidance provided by the (Senior Level) Interagency Committee (A).
	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) begin work on Economic Factors (Task 4), Political Factors (Task 5) and Policy Factors (Task 6).
1 June	Establishment of Economic, Political, National Security, and Legal Evaluation Groups.
	FCC Advisory Committee (F) finishes inputs for Band/Service Selection (Task 1).
15 June	IRAC Ad Hoc 178 (D) finishes inputs for Band/Service Selection (Task 1).
1 July	Interagency Committee (A) provides guidance.
15 July	FCC SPACE WARC Preparatory Committee (C) finishes inputs for Band/Service Selection (Task 1).
1 Aug	Economic Evaluation Group (G) begins work on inputs for Economic Evaluation (Task 4).
15 Aug	Policital Evaluation Group (H) begins work on inputs for Political Evaluation (Task 5).
1 Sep	National Security Evaluation Group (I) begins work on inputs for National Security Evaluation (Task 7).
1 Oct	Legal Evaluation Group (J) begins work on inputs for Legal Evaluation (Task 8).
1 Dec	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) finish inputs for Planning Approach Selection (Task 2).
15 Dec	FCC Advisory Committee (F) completes preliminary inputs for Economic Factors (Task 4), Political Factors (Task 5), Policy Factors (Task 6), and Legal Factors (Task 8).
	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) begin work on U.S. position for Planning Approach Selection (Task 2).

1983

1 Jan	Interagency Committee (A) provides guidance.
15 Jan	Coordinating Committee (B) begins U.S. position for Planning Approach Selection (Task 2).
15 Feb	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) complete preliminary inputs for Political Factors (Task 5), Economic Factors (Task 4), and Policy Factors (Task 6).
1 Apr	FCC Advisory Committee (F) finishes inputs for Technical Considerations (Task 3).
1 May	FCC SPACE WARC Preparatory Committee (C), IRAC Ad Hoc 178 (D) and U.S. CCIR Ad Hoc 4/1 (E) finish inputs for Technical Considerations (Task 3).
15 May	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) begin work on U.S. position for Technical Considerations (Task 3).
	FCC Advisory Committee (F) finishes inputs for Economic Factors (Task 4), Political Factors (Task 5), Policy Factors (Task 6), and Legal Factors (Task 8).
1 June	U.S. CCIR Ad Hoc 4/1 (E) finishes inputs for Planning Approach Selection (Task 2).
	Economic Evaluation Group (G) finishes inputs for Economic Factors (Task 4).
1 July	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) complete U.S. position for Technical Factors (Task 3).
	FCC Advisory Committee (F) finishes inputs for Planning Approach Selection (Task 2).
	Political Evaluation Group (H) finishes inputs for Political Factors (Task 5).
	Interagency Committee (A) provides guidance.

15 July	National Security Evaluation Group (I) finishes inputs for National Security Factors (Task 7).
1 Aug	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) finish inputs for Economic Factors (Task 4).
	Legal Evaluation Group (J) finishes inputs for Legal Factors (Task 8).
1 Sep	Interagency Committee (A) approves U.S. position on Political Factors (Task 5).
	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) complete U.S. position for Planning Approach Selection (Task 2).
1 Oct	Interagency Committee (A) approves U.S. position on Policy Factors (Task 6).
	Coordinating Committee (B) completes U.S. position for Planning Approach Selection (Task 2).
1 Nov	Interagency Committee (A) approves U.S. position on National Security Factors (Task 7).
1 Dec	Interagency Committee (A) approves U.S. position on Legal Factors (Task 8).
	FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) begin input work on U.S. Proposals (Evaluation) (Task 9).
1984	
1 Jan	Interagency Committee (A) provides guidance.
1 Mar	Coordinating Committee (B), FCC SPACE WARC Preparatory Committee (C) and IRAC Ad Hoc 178 (D) finish input work for U.S. Proposals (Evaluation) (Task 9).
1 May	Coordinating Committee (B) begins input work on U.S. Proposal Preparation (Task 10).
1 July	Interagency Committee (A) provides guidance.
1 Aug	Coordinating Committee (B) completes input work on U.S. Proposal Preparation (Task 10) and submits to the Interagency Committee (A) for approval.

1 Sep	FCC SPACE WARC Preparatory Committee (C) prepares Report and Order for approval.
	IRAC Ad Hoc 178 (D) submits U.S. Proposals to IRAC for approval.
30 Sep	Interagency Committee (A) approves U.S. Proposals (Task 10).
	FCC approves Report and Order.
1 Nov	U.S. Department of State forwards U.S. Proposals for SPACE WARC to Secretary General of the ITU.
1985	
1 Jan	Interagency Committee (A) provides guidance.
15 June	Interagency Committee (A) provides final guidance.

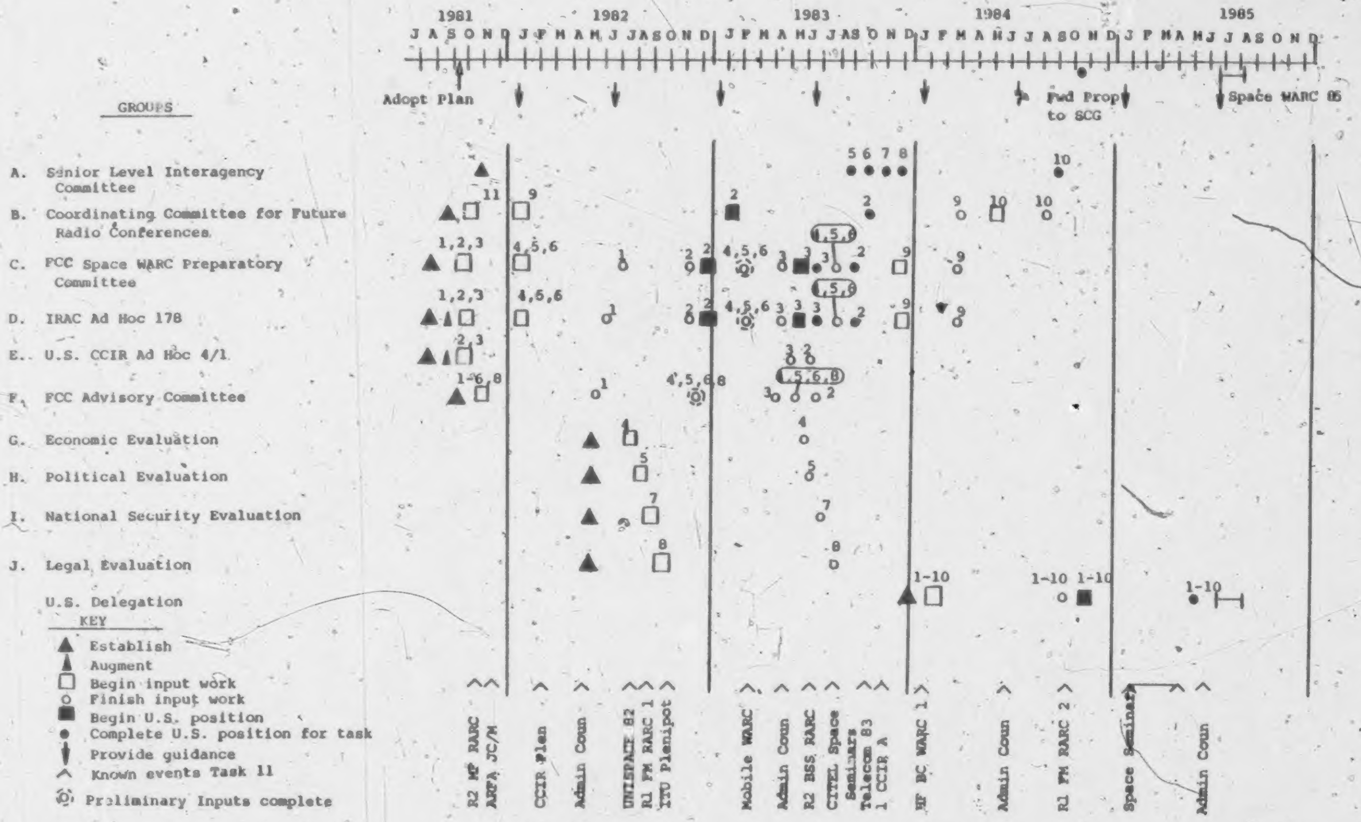
Throughout the preparatory period scheduled above, the Coordinating Committee for Future Radio Conferences (B) must attend to the Avenues for Achievement (Task 11), providing positions, papers and guidance for at least those milestones indicated at the bottom of Appendix 1 to Attachment 4; planning, arranging, and providing guidance for multilateral and bilateral coordination; etc.

U.S. DELEGATION

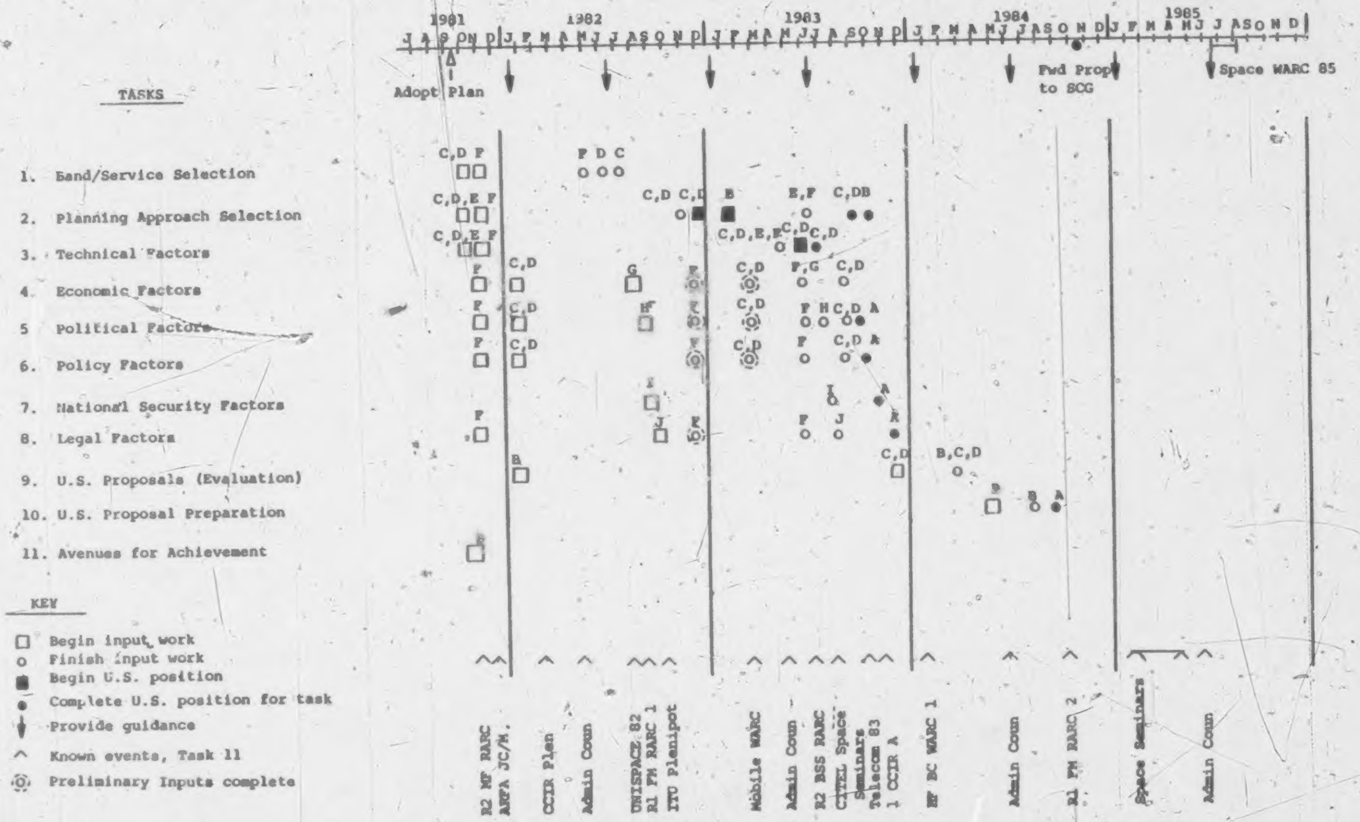
In addition to this preparatory effort, there is also the matter of the U.S. Delegation for SPACE WARC. The U.S. Delegation Chairman and Initial Delegation Group (IDG) will be appointed during January 1984. During the period January-November 1984, the Delegation will review the information prepared by the various groups on Tasks 1-10. The Delegation will then work on the preparation of position papers on Tasks 1-10 during the period November 1984 through June 1985, completing the work prior to departing for SPACE WARC. Periodic guidance will be provided to the Delegation by the Interagency Committee (A).

Appendix 2 is a PERT diagram which depicts the key events in preparation for SPACE WARC. The overall preparation structure for these efforts is given in Appendix 3.

SPACE WARC PREPARATION SCHEDULE

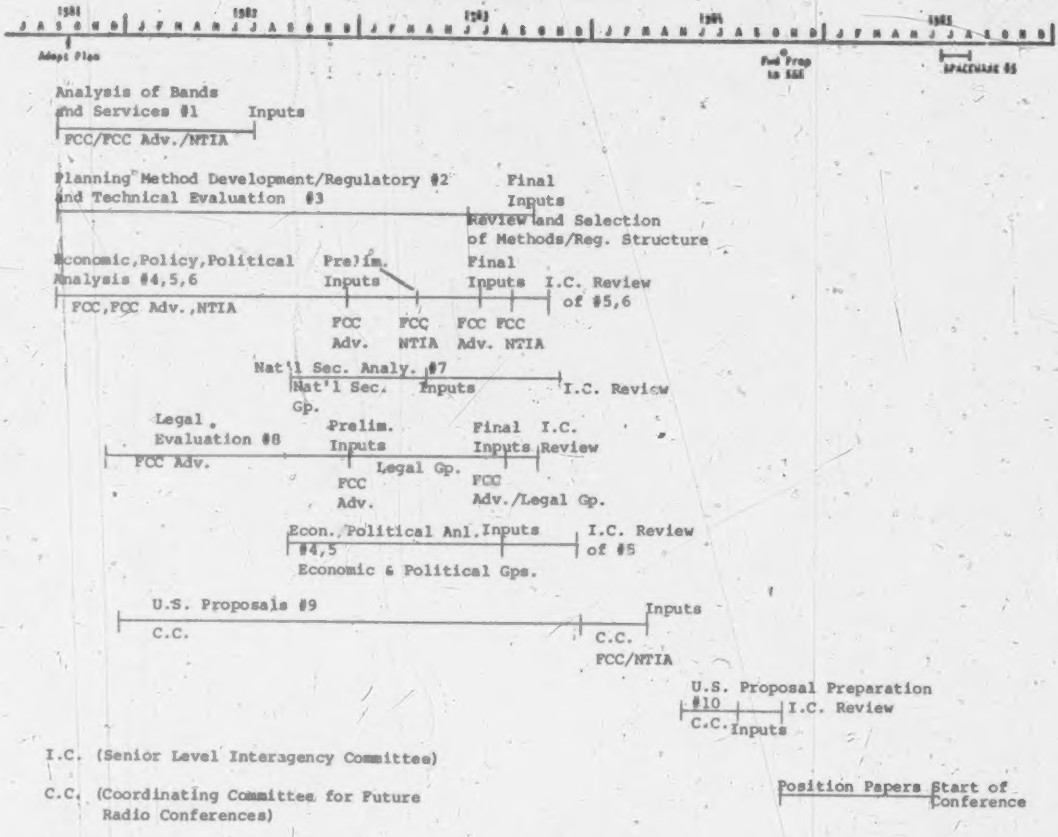


(Appendix 1 to Attachment 4)



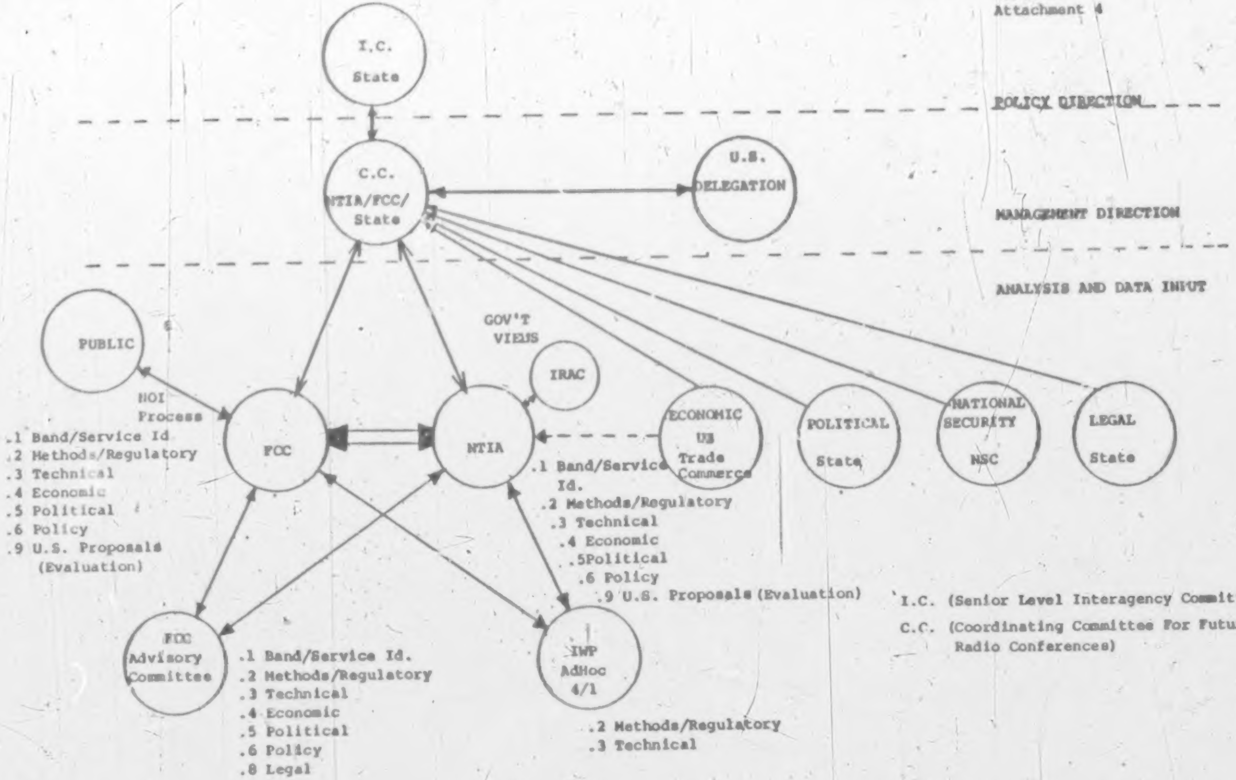
Appendix 2 to
Attachment 4

KEY EVENTS FOR SPACE WARC PREPARATION



Appendix 3 to
Attachment 4

PREPARATORY STRUCTURE


I.C.
State
POLICY DIRECTION
C.C.
NTIA/FCC/
State
U.S.
DELEGATION
MANAGEMENT DIRECTION
ANALYSIS AND DATA INPUT
PUBLIC
NOI
Process
.1 Band/Service Id
.2 Methods/Regulatory
.3 Technical
.4 Economic
.5 Political
.6 Policy
.9 U.S. Proposals
(Evaluation)
GOV'T
VIEWS
IRAC
FCC
NTIA
ECONOMIC
US
Trade
Commerce
POLITICAL
State
NATIONAL
SECURITY
NSC
LEGAL
State
.1 Band/Service
Id.
.2 Methods/Regulatory
.3 Technical
.4 Economic
.5Political
.6 Policy
.9 U.S. Proposals (Evaluation)
FCC
Advisory
Committee
.1 Band/Service Id.
.2 Methods/Regulatory
.3 Technical
.4 Economic
.5 Political
.6 Policy
.8 Legal
IWP
AdHoc
4/1
.2 Methods/Regulatory
.3 Technical

I.C. (Senior Level Interagency Committee)

C.C. (Coordinating Committee For Future
Radio Conferences)

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DEPARTMENT OF STATE

TD Serial No. 116

OFFICE OF INTERNATIONAL
COMMUNICATIONS POLICY

REPORT OF THE CHAIRMAN OF THE
UNITED STATES DELEGATION
TO THE
WORLD ADMINISTRATIVE RADIO CONFERENCE
OF THE
INTERNATIONAL TELECOMMUNICATION UNION

Geneva, Switzerland

September 24 - December 6, 1979

Submitted to the Secretary of State by

Glen O. Robinson

Chairman, United States Delegation

Prepared by Members of the Delegation

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The Honorable
The Secretary of State
Washington, D.C.

Sir:

As Chairman of the United States Delegation to the World Administrative Radio Conference of the International Telecommunication Union, which was held at Geneva, Switzerland from September 24 through December 6, 1979, I have the honor to submit a report of the activities of the Conference, the results of its work, and the United States participation therein.

I. BACKGROUND

A. The World Administrative Radio Conference was held at the Centre International de Conferences de Geneve, from September 24, 1979 to December 6, 1979, under the auspices of the International Telecommunication Union (ITU). Founded in 1865 as the International Telegraph Union, the ITU is the oldest existing organization associated with the United Nations, of which it is the specialized agency for telecommunications.

B. The last General World Administrative Radio Conference was held in 1959, in Geneva, Switzerland. It essentially adopted the format of the Table of Frequency Allocations and procedural regulations established at the prior General World Administrative Radio Conference held in Atlantic City in 1947.

C. The increased complexity of radiocommunication techniques, coupled with heightened competition for space in the electromagnetic spectrum, gave rise to a new forum in the early 1960's -- the specialized world administrative radio conference. Specialized conferences consider and revise, in the light of experience and technological advance, the Radio Regulations pertaining to a limited aspect of radiocommunications. (The Radio Regulations, though formally annexed to the International Telecommunication Convention, the basic instrument of the ITU, have separate treaty status.) There have been eight specialized World Administrative Radio Conferences since the early 1960's:

1963:	Space Conference (Spa)
1964, 1966:	Aeronautical Conference (Aer)
1967:	Maritime Conference (Mar)
1971:	Space Conference (Spa2)
1974:	Maritime Conference (Mar2)
1977:	Broadcasting-Satellite Conference (Sat)
1978:	Aeronautical Conference (Aer2)

D. The Plenipotentiary Conference, held in Malaga-Torremolinos in 1973, took the first steps (Resolution No. 28) to convene the 1979 World

Administrative Radio Conference (WARC). It based its decision on the following:

1. that, since 1959, various world administrative radio conferences have amended the Radio Regulations and Additional Radio Regulations on specific points without having been able to harmonize the decisions taken because of the limited nature of their agenda;

2. that, as a result of technical advances, some of the provisions in these Regulations should be reconsidered, particularly with regard to certain services which are developing rapidly;

3. that, for these reasons, a general revision of the Radio Regulations and of the Additional Radio Regulations should be undertaken.

E. Action by the Administrative Council:

1. At the 30th Session (1975) of the Administrative Council, the Council considered Resolution No. 28 cited above and held an exchange of views on the agenda of the Conference and on the necessary preparations for holding it. The Council decided that the agenda, date and duration of the Conference should be fixed by the Council at its 31st Session through a consultation of Member administrations The Council also instructed the Secretary General to invite administrations to send to him for submission to the Council any suggestions they might wish to make on the items mentioned. The Secretary General also had to ask administrations for their opinions on the studies to be undertaken by the permanent organs of the Union, including the need for convening a special joint meeting of the International Radio Consultative Committee (CCIR) Study Groups in 1978 (subsequently called the Special Preparatory Meeting).

2. At its 31st Session (1976), the Council examined Members' replies to the consultation held by the Secretary General and drew up a draft agenda for the Conference; this draft was approved by the Members, but the Council, after discussing the matter, left open the possibility of re-examining the question at its next Session if necessary. The Council further decided that the CCIR Special Preparatory Meeting should be held during the last quarter of 1978, to ensure that the technical data required for the preparations for the Conference were brought up to date.

3. At its 32nd Session (1977), the Council had to reconsider the agenda of the Conference, particularly as the result of certain decisions taken by the WARC for Satellite Broadcasting (Geneva, 1977) In accordance with No. 221 of the Convention, the Council proposed to the Members of the Union a final agenda which was accepted by the majority of the Members (Resolution No. 801). At that same Session, the Council adopted Resolution No. 804, whereby the CCIR was invited to carry out the studies necessary to ensure timely provision of the

technical information likely to be needed as a basis for the work of the Conference, and to arrange for a Special Preparatory Meeting of the CCIR Study Groups for the purpose of providing documentation to serve as a technical basis for the Conference. The CCIR was also invited to make the necessary arrangements to ensure the widest possible participation in this Special Preparatory Meeting.

4. At its 33rd Session (1978), the Council drew up the budget of the Conference and adopted a series of Recommendations, some relating to the period of preparations for the Conference and others to the work of the Conference itself. The purpose of these Recommendations was to reduce the volume of work of the Secretariat or to distribute the work in a timely fashion.

F. The CCIR held the Special Preparatory Meeting (SPM) in Geneva during the period October 23 - November 17, 1978. Under the chairmanship of Dr. John A. Saxton (U.K.), the SPM was attended by more than 700 delegates and observers from 85 administrations, 40 recognized private operating agencies and scientific and industrial organizations, 3 U.N. specialized agencies, and 15 regional and international organizations. The purpose of the meeting was as follows:

> "To prepare a Report providing technical bases for the WARC-79 and for the use of Administrations in preparing their proposals to that Conference. This Report is to be based on the texts approved by the XIVth Plenary Assembly of the CCIR as well as on new contributions submitted by Administrations and other participants in the work of the CCIR; the Report should be presented in a form consistent with the various items of the Agenda of the WARC-79."

The results of the SPM were published by the ITU in a 525 page document that was distributed to all administrations as WARC Document No. 13. The SPM Report was based on current reports and recommendations of the CCIR Study Groups and on the contents of more than 300 new documents submitted directly to the meeting. The report provided an extremely valuable technical basis for the 1979 WARC deliberations, particularly since it was arranged in a logical narrative format rather than the somewhat confusing multitude of independent reports and recommendations presently found in the CCIR Green Books.

G. The Secretary General, in close cooperation with the Director of the CCIR and the International Frequency Registration Board (IFRB), held three Regional Seminars in preparation for the 1979 WARC, primarily for the benefit of developing countries. The location and dates were as follows:

Nairobi, Kenya	February 12 - 23, 1979
Panama City, Panama	March 12 - 23, 1979
Sydney, Australia	March 29 - April 10, 1979

The seminars were well attended by countries of the respective Regions, in large part due to the fact that funds were provided to pay for travel and expenses of two participants from each developing country in the area. Lecturers were drawn from the ITU staff, from developed countries, and from developing countries. The U.S. provided a speaker on the subject of allocations above 40 GHz at each of the three seminars. In addition, there were approximately ten observers from the U.S. at each seminar, for the purpose of establishing or renewing contact with foreign participants, providing technical and operational expertise on the various issues, and advancing the U.S. proposals and objectives as appropriate.

II. AGENDA

The Agenda of the 1979 World Administrative Radio Conference, as adopted by the Administrative Council (Resolution 801) and subsequently approved by the Conference was as follows:

"That the Conference shall be convened in Geneva on 24 September 1979 for a duration of ten weeks,

1. To review and, where necessary, revise the provisions of the Radio Regulations relating to terminology, the allocation of frequency bands and the directly-associated regulations (Articles 1 to 6 and Sections I, II, III, VI, VII, VIII and IX of Article 7 and related Appendices not applying to a single service);

2. to review and where necessary, revise the provisions applicable to the coordination, notification and recording of frequency assignments except those Articles relating to a single Service (Articles 9 and 9A, and related Appendices, but not Articles 9B and 10);

3. to review and, where necessary, revise the other Articles applicable to more than one Service (Articles 12 to 20 and related Appendices not applying to a single Service) and provisions applicable to miscellaneous stations and Services (Articles 41 to 44 and related Appendices);

4. to make any necessary consequential editorial amendments to other provisions of the Radio Regulations and the Additional Radio Regulations resulting from the action taken under agenda items 1, 2 and 3 above;

5. to review the report on the activity of the IFRB and revise, where necessary, the provisions relating to its methods of work and internal regulations (Articles 8 and 11);

6. to study the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions;

7. to take account of Resolution No. Sat-10 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977, on the possible rearrangement of the Radio Regulations and Additional Radio Regulations, to make such consequential changes as may be necessary to harmonize the Radio Regulations as well as the Additional Radio Regulations and to undertake any further necessary refinement and deletion of superfluous or redundant provisions;

8. to consider the proposals based on the International Telegraph and Telephone Consultative Committee (CCITT) studies carried out in accordance with Resolutions Nos. Mar2-22 and 23, and to take appropriate decisions;

9. to consider the Resolutions and the Recommendations adopted by Administrative Radio Conferences, to take such an action as may be considered necessary and to adopt such new Resolutions and Recommendations as may be necessary;

10. to propose to the Administrative Council and to the next Plenipotentiary Conference a programme for convening future Administrative Radio Conferences to deal with specific Services;

11. to provide, for the benefit of future Administrative Radio Conferences, such guidelines as may be found necessary for optimum use of the frequency spectrum."

III. PREPARATION FOR THE CONFERENCE

A. The U.S. preparation for the 1979 WARC was by far the most extensive ever undertaken for an ITU or any other telecommunications event. In fact, WARC was one of the largest international conferences in which the United States has ever participated. It was the first general conference in twenty years with the power to consider all uses of the radio frequency spectrum as well as related technical and procedural provisions. Results of the 1979 WARC are expected to guide the development and use of communication-electronic equipment and the operation of national and international radio systems into the next century. Therefore it was natural that there was deep and widespread interest in all sectors of the telecommunications community within and outside the U.S.

B. Domestic activities:

1. The National Telecommunications and Information Administration (NTIA) (and its predecessor, the Office of Telecommunications Policy), as manager of the Federal Government sector in this field, formally began its preparation in January 1974 when its Interdepartment Radio Advisory Committee (IRAC) established Ad Hoc 144. All federal agencies with major radio interests are members of IRAC and participated actively in the work of the ad hoc group. Its terms of reference were: "To develop recommended U.S. proposals for the 1979 WARC, comments on the proposals of other administrations and position papers for the U.S.

delegation to the Conference, and to plan for the eventual national implementation of the Final Acts of the Conference." The result of this effort was NTIA's submission of recommended U.S. proposals to the Department of State in December 1978.

2. The Federal Communications Commission (FCC), as regulator of private sector telecommunications, initiated formal public proceedings on WARC preparations in January 1975 with the release of the First Notice of Inquiry in Docket 20271. An internal steering committee consisting of members from each of the FCC's bureaus and offices was established to provide overall coordination of the Commission's efforts. A formal Industry Advisory Committee and twenty-two service working groups dealing with specific issues were set up to provide direct input to the FCC staff. The Commission issued a total of nine Notices of Inquiry on various aspects of the WARC agenda, the most significant being the 3rd, 5th and 8th which treated the Table of Frequency Allocations. In December 1978, the FCC completed its Inquiry and released a Report and Order containing recommended U.S. proposals, which were submitted to the Department of State.

3. The Department of State, itself a member of IRAC, worked closely with NTIA and FCC on the development of national proposals from the beginning in 1974. In addition, the Department began in 1975 to consider other aspects of the preparatory effort, such as funding for U.S. delegation participation, selection of the Head of Delegation and other members, and a program of foreign consultations. This effort was formalized in September 1976 with the creation of a high-level Policy Group comprised of the OTP Director, the FCC Chairman, the Department's Deputy Assistant Secretary responsible for telecommunications, and senior officials of other key agencies "as required".

In early 1977 the Department initiated a worldwide effort through its overseas posts to obtain foreign views and other details regarding preparation for the 1979 WARC. Replies from Embassies provided an invaluable source of information on foreign positions. In January 1978 the Department named the Chairman of the U.S. Delegation to the WARC, who was responsible directly to the Deputy Secretary of State. He was assisted by a specially established staff which eventually included six high- and mid-level officers.

An initial delegation group of twenty persons was formed in April 1978 with membership drawn from federal government agencies active in WARC preparations. One month later, the Department established a 38-member public advisory committee comprised of a balanced membership drawn from industry and the general public. The general purpose of both groups was to advise the Department and specifically the Chairman of the U.S. Delegation on all WARC matters, and to develop positions and negotiating strategies for the Conference.

The Department received recommended proposals from the FCC and NTIA in December 1978, which were melded into a unified set of U.S. proposals for transmittal to the ITU. All but one part of the U.S. proposals were sent to Geneva in January 1979. Proposals relating to Frequency Allocations below 27.5 MHZ were forwarded to the ITU in April, after resolution of different views regarding requirements for international shortwave broadcasting. In May 1979 the Department accredited a delegation of 64 persons (later increased to 67) and 6 Congressional advisers.* A Geneva support group of 34 persons (later increased to 40) was also named at the same time.

The difficult process of selecting delegates and determining the size of the delegation and support team was based on several criteria. First was the need for expertise and experience in spectrum management generally, and in the specific areas addressed by the WARC agenda and the U.S. proposals. This expertise was not confined to professional engineers, though they comprised the largest group in this category. A second need was experience in general political and foreign affairs independent of specific background in ITU activities. Third was the need for representation of various domestic interests, including federal agencies, industries and general public groups, that would be significantly affected by WARC. Fourth, there was a mandate to seek out women and minorities. Finally, there was the Departmental policy to keep the accredited delegation to the minimum number necessary to accomplish the mission. The final U.S, team of 67 delegates (plus 2 Congressional advisers) and 40 support personnel represented a considered balance of the factors listed above.

C. Foreign consultations: Beginning in 1977 the U.S. engaged in extensive international consultations on WARC with a view to explaining U.S. views on the Conference and obtaining information on foreign positions. Substantial effort was given to and emphasis placed on visits by small teams of U.S. experts to foreign capitals to carry out face-to-face, one-on-one discussions with appropriate telecommunications officials and organizations. While not able to visit all countries desired, it was possible to visit 48 countries for bilateral talks, with a good balance between developed and developing nations. The countries visited were as follow:

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*Senators Goldwater and Hollings and Representatives Hollenbeck and McDade were accredited but did not attend the Conference. Therefore, their names do not appear in the WARC List of Participants or in Annex B of this document.

Algeria
Fed. Rep. of Germany
Saudi Arabia
Argentina
Australia
Brazil
Cameroon
Canada
Chile
People's Rep. of China
Colombia
Republic of Korea
Ivory Coast
Denmark
Egypt
Spain
France
Ghana
Greece
India
Indonesia
Iran
Israel
Italy
Japan
Kenya
Liberia
Morocco
Mexico
Nigeria
Norway
New Zealand
Pakistan
Panama
Netherlands
Peru
Philippines
United Kingdom
Senegal
Singapore
Sudan
Switzerland
Turkey
U.S.S.R.
Uruguay
Venezuela
Yugoslavia
Zaire

In addition to biateral discussions described above, the U.S. participated in multilateral forums such as NATO's Allied Radio Frequency Agency, CEPT (Conference of European Postal and Telecommunications Administrations) and CITEL (Inter-American Telecommunications Conference), an arm of the OAS. The U.S. also attended the three ITU Regional Preparatory Seminars for WARC, held in Nairobi, Panama and Sydney. In each multilateral event, U.S. attendees endeavored to establish bilateral contacts with as many foreign participants as possible, and in particular, with persons from countries not visited.

D. The massive preparatory effort undertaken by the U.S. resulted in specific objectives for the 1979 WARC that were contained in more than 900 individual items submitted to the Conference as the formal U.S. Proposals. In addition, the U.S. developed four general objectives for the Conference to provide broad guidance to the delegation. They were as follows:

1. To achieve international agreement on necessary changes in the ITU regulations on the orderly use of the electromagnetic spectrum in order to enhance U.S. economic, social and national security interests.

2. To maintain those ITU procedures which provide maximum flexibility and adaptability to changing needs.

3. To support incremental changes in international allocations and related frequency management procedures which will accommodate the needs of other nations, consistent with our own essential requirements, while endeavoring to avoid or limit the impact of politically inspired efforts to restrict our use of the spectrum.

4. To assure an outcome of the Conference which will support the role of the ITU as the international organization responsible for implementing WARC decisions, while not adversely affecting the sovereign rights of the United States.

IV. PARTICIPATION

At the time of the Conference, the Union consisted of 154 member countries. One hundred forty-two (142) Members participated in the Conference and were represented by approximately 1670 delegates and advisers. Fifteen of the participating countries were not entitled to vote at the Conference and nine were not entitled to sign the Final Acts. (See also Section VII B, Report of the Credentials Committee.)

Present as observers were approximately 130 participants from one private operating agency, the United Nations and five of its Specialized Agencies, three regional organizations and twenty-six other international organizations. In addition, approximately 150 ITU officers and staff members and a large number of interpreters and translators participated in and/or supported the Conference on a full-time basis. A list of the countries with number of delegates and ITU country symbol, and a list of the organizations in attendance is attached as Annex A.

The United States participated in the 1979 WARC with an accredited delegation of 69 members, including two Congressional advisers. This was the second largest delegation at the Conference, after the French (87 delegates). For comparison purposes, the next largest delegation was that of the Federal Republic of Germany with 51 delegates. Nine countries participated with delegations of 30 or more members.

The U.S. Delegation was supported in Geneva by a group of 40 persons consisting of technical, computer and administrative personnel. The delegation was also supported by a home team in Washington headed by Mr. Gordon L. Huffcutt of the State Department and comprised of representatives from each of the interested government agencies. A list of the persons comprising the U.S. Delegation and the Geneva support team is attached as Annex B. Because of its unique direct relationship to the Department in preparation for WARC, the membership of the Department of State Public Advisory Committee is also listed in Annex B. It is unfortunate that it is impossible to list the names of hundreds of other individuals who played an active and significant role in the U.S. preparation for and participation in this important conference.

V. ORGANIZATION OF THE CONFERENCE - COMMITTEE STRUCTURE

A. Conference:

Chairman of the Conference: Mr. R. J. P. SEVERINI (Argentina)

Vice-Chairmen of the Conference:
Mr. A. L. BADALOV (USSR)
Mr. J. JIPGUEP (Cameroon)
Mr. H. KIEFFER (Switzerland)
Mr. LI LINCHUAN (China)
Mr. A. PETTI (Italy)
Mr. Glen O. ROBINSON (USA)

(Note: Kieffer had the special role as overall coordinator of Committees 4, 5, and 6.)

Secretary: Mr. M. MILI

Executive Secretary: Mr. A. WINTER-JENSEN

Technical Secretary: Mr. G. BROOKS, assisted by Mr. A. A. MATTHEY

Administrative Secretary: Mr. U. PETIGNAT

Legal Adviser: Mr. A. NOLL

B. Committees:

Committee 1 - Steering Committee

Chairman: Mr. R. J. P. SEVERINI
Members: Consists of Chairman and Vice-Chairmen of the Conference, and of the Chairmen and Vice-Chairmen of the other Committees
Secretary: Mr. H. POULIQUEN
U.S. Spokesman: Mr. Glen O. ROBINSON
Terms of Reference: To coordinate the work of the Committees, fix the timetable of meetings, etc.

Committee 2 - Credentials Committee

Chairman: Mr. C. J. MARTINEZ (Venezuela)
Vice-Chairman: Dr. Amer JOMARD (Iraq)
Secretary: Mr. A. WINTER-JENSEN
U.S. Spokesman: Mr. K. SCHAEFER
Terms of Reference: To verify the credentials of delegations and to report on its conclusions to the Plenary Meeting within the time specified by the latter.

Committee 3 - Budget Control Committee

Chairman: Mr. Z. KUPCZYK (Poland)
Vice-Chairman: Mr. K. P. R. MENON (Malaysia)
Secretary: Mr. R. PRELAZ
U.S. Spokesman: Mr. C. WARVARIV
Terms of Reference: To determine the organization and the facilities available to the delegates and to examine and approve the accounts for expenditure incurred throughout the duration of the Conference.

Committee 4 - Technical Regulations Committee

Chairman: Mr. N. MORISHIMA (Japan)
Vice-Chairman: Mr. M. CISSE (Senegal)
Secretary: Mr. C. GLINZ
U.S. Spokesman: Mr. R. PARLOW
Terms of Reference: To consider proposals concerning the following Articles:

Article N1, Terms and Definitions, Section V, Space, Orbits and Types of Objects in Space, Section VI, Technical Characteristics;

Article N2, Nomenclature of the Frequency and Wavelength Bands used in Radiocommunication;

Article N3, Designation of Emissions;

Article N4, Technical Characteristics;

Article N16, Interference;

Article N17, Tests;

and the related Appendices 3, 4, 5, and B.

To consider proposals concerning technical provisions included in the following Articles:

Article N25, Terrestrial Radiocommunication Services sharing Frequency Bands with Space Radiocommunication Services above 1 GHz;

Article N26, Space Radiocommunication Services sharing Frequency Bands with Terrestrial Radiocommunication Services above 1 GHz;

Article N27, Special Rules relating to Space Radiocommunication Services;

Article N33, Radiodetermination Service and Radiodetermination Satellite Service, Section IVB, Radiobeacon Stations;

and the related Appendices 28 and 29.

To consider as appropriate to the work of the Technical Regulations Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations and also to consider Appendix A.

Committee 5 - Frequency Allocations Committee

Chairman: Mr. M. HARBI (Algeria)
Vice-Chairman: Mr. J. J. HERNANDEZ-G. (Mexico)
Secretary: Mr. M. SANT
U.S. Spokesman: Mr. W. R. TORAK
Terms of Reference: To consider proposals concerning the following Articles:

Article N1, Terms and Definitions (Sections II-IV); Section II, Radio Systems; Section III, Terrestrial Radio Systems, Services and Stations; Section IV, Space Radio Systems, Services and Stations and Radio Astronomy;

Article N5, General Rules for the Assignment and Use of Frequencies;

Article N6, Special Agreements;

Article N7, Frequency Allocations;

Article N8, Special Rules for the Assignment and Use of Frequencies;

Article N28, Section I, Broadcasting Service;

Article N29, Fixed Service;

Article N47, Special Rules relating to the Use of Frequencies in the Aeronautical Mobile Service;

and the related Appendix 24.

To consider as appropriate to the work of the Frequency Allocations Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 6 - Regulatory Procedures Committee

Chairman:	Mr. M. JOACHIM (Czechoslovakia)
Vice-Chairman:	Mr. E. J. WILKINSON (Australia)
Secretary:	Mr. R. PLUSS
U.S. Spokesman:	Mr. F. S. URBANY
Terms of Reference:	To consider proposals concerning the coordination, notification and registration of frequency assignments, and the activities of the IFRB and, in particular, proposals concerning the following Articles:

Article N9, Co-ordination, Notification and Registration of Frequencies - International Frequency Registration Board, General Provisions;

Article N10, Internal Regulations of the International Frequency Registration Board;

Article N11, Co-ordination of Frequency Assignments to Stations in a Space Radiocommunication Service except Stations in the Broadcasting Satellite Service and to appropriate Terrestrial Stations;

Article N12, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Terrestrial Radiocommunication Stations;

Article N13, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Radio Astronomy and Space Radiocommunication Stations except Stations in the Broadcasting Satellite Service;

and the related Appendices 1, 1A and 1B.

To consider proposals concerning regulatory measures against harmful interference covered by the following Articles:

Article N18, International Monitoring;

Article N19, Reports of Infringements;

Article N20, Procedure in a Case of Harmful Interference;

and the related Appendices 6, 7, 8 and 9.

To consider as appropriate to the work of the Regulatory Procedures Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 7 - General Administrative Committee

Chairman: Mr. P. O. OKUNDI (Kenya)
Vice-Chairman: Mr. H. L. VENHAUS (Fed. Rep. of Germany)
Secretary: Mr. A. ZACCAGNINI
U.S. Spokesman: Mr. W. LUTHER
Terms of Reference: To deal with proposals on general administrative matters not covered by other Committees, and in particular to consider proposals concerning the following Articles:

Article N1, Terms and Definitions, Section I, General Terms;

Article N21, Secrecy;

Article N22, Licences;

Article N23, Identification of Stations;

Article N24, Service Documents;

Article N30, Amateur Service and Amateur Satellite Service;

Article N31, Standard Frequency Service and Time Signal Service;

Article N32, Experimental Stations;

Article N33, Radiodetermination Service and Radiodetermination Satellite Service, Sections I, II, III and IVA;

Article N39, Special Services relating to Safety;

Article N73, Effective Date of the Radio Regulations;

and the related Appendices C, 9, 10 and 23.

To consider proposals on the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions.

To suggest to the Plenary Meeting, taking account also of the advice of the other Committees, a programme of future Administrative Radio Conferences to deal with specific services with a view to presenting advice on such a programme to the ITU Administrative Council for subsequent submission to the Plenipotentiary Conference.

To consider Resolution No. Sat-4 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977, and to take such action as may be considered necessary.

To consider as appropriate to the work of the General Administrative Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 8 - Restructure Committee

Chairman: Mr. O. LUNDBERG (Sweden)
Vice-Chairman: Mr. G. I. WARREN (Canada)
Secretary: Mr. J. PELEGRI
U.S. Spokesman: Mr. D. ANDERSON
Terms of Reference: To consider the specific proposals concerning the basic re-arrangement of the Radio Regulations and the Additional Radio Regulations, and the further refinement and deletion of superfluous or redundant provisions in Articles N34 - 38, N40 - 46 and N48 - 72, as well as any consequential amendments

concerning those Articles, related Appendices, Resolutions and Recommendations including the adoption of any new resolutions and recommendations.

To consider proposals based on the CCITT studies carried out in accordance with Resolutions Nos. Mar2-22 and Mar2-23 and to take such action as may be considered necessary.

Committee 9 - Editorial Committee

Chairman: Mr. P. BASSOLE (France)
Vice-Chairmen: Mr. V. QUINTAS (Spain)
Mr. D. E. BAPTISTE (United Kingdom)
Secretary: Mr. R. MACHERET
U.S. Spokesman: Mrs. Ann ALDRICH
Terms of Reference: To perfect the form of the texts of the Final Acts without altering the sense.

C. Ad Hoc and Working Groups: A complete listing of groups below the committee level, including the chairman, U.S. spokesman and terms of reference is given in Annex C.

VI. GENERAL ATMOSPHERE OF THE CONFERENCE

A. The 1979 WARC was the first general conference to be held in twenty years. There were many important issues and requirements to be treated under its agenda and in many cases they involved direct conflict of objectives among the ITU Members. The membership of the ITU had increased 60% since 1959, entirely through the addition of developing countries. The WARC itself, as well as several key issues, were actively discussed in various non-aligned and developing country forums. In view of these facts, the U.S. and most other participating countries expected the 1979 WARC to be different from and more difficult than its predecessor in 1959 and the more recent specialized radio conferences.

B. Some observers had predicted an all-out North-South political confrontation. Concern was expressed that the ITU would go the way of other U.N. Specialized Agencies and become a forum in which international agreement on tangible objectives is replaced by ideological, confrontational debate. Of special concern was the fear that WARC would take up the debate of the so-called New World Information Order (NWIO). Such a course would divert the Conference from its proper task and impede constructive negotiation on the concrete objectives of radio spectrum regulation. The record speaks for itself. There was no rhetorial debate over a NWIO, and in general, very little political discussion that was not directly relevant to the technical, economic and operational tasks which had been assigned to the Conference. For example, the political issues of direct broadcast satellite and remote sensing currently being discussed in the U.N. Outer Space Committee never came up during the WARC. It is significant that two-thirds of the political position papers prepared in advance for Delegation use in Geneva were never used since the issue did not arise. However, some of the broader North-South political tensions that underlied the New Information Order debate were present throughout the Conference, surfacing in various ways.

C. The most difficult issue of this type involved the selection of a Conference Chairman. In the year or more preceding the opening of the Conference, widespread support had developed for Derek Rose of New Zealand as Conference Chairman. His name had been mentioned at the various Regional Preparatory Seminars prior to the Conference and his candidacy was endorsed by the United States. There was no opposition to Mr. Rose until several months prior to the WARC when the Indian Administration began pushing for their own representative, T. V. Srirangan, as Chairman. In an unprecedented move for ITU radio conferences, the Indian Government pressed his candidacy through diplomatic channels. In early September 1979, India's candidate obtained support at the Havana Non-Aligned Summit Meeting in the form of a resolution calling for a non-aligned country chairman of the WARC. India continued to seek support for their candidate at various non-aligned, Arab, African and Latin American meetings held in Geneva during the two weeks immediately prior to the Conference.

Several days before the opening date, it became obvious to the U.S. and other key delegations, and to ITU officials, that a serious problem was developing. For the first time, the ITU might be forced to vote for the chairman of a conference. Much more troublesome was the fact that the vote would be made along political and ideological lines which would jeopardize the possibility for a successful conference in the scheduled ten week duration. The U.S. firmly maintained its position that the slate of conference officers must be adopted by consensus, thereby indicating acceptance by all participating administrations. In an effort to seek a consensus candidate, an informal meeting of about ten heads of delegation representing all ITU Regions and regional groups, including the coordinator for the non-aligned caucus, was held the day before the scheduled opening date for the Conference. Neither India nor New Zealand attended. The group unanimously agreed to a consensus slate headed by Henry Kieffer of Switzerland.

It is customary at ITU conferences for the heads of delegation to meet on the first morning of the conference to agree to a slate of officers that would be presented to the opening plenary session in the afternoon. Tradition was broken at the 1979 WARC to allow a morning meeting of the non-aligned group. At this meeting, India was successful in having the consensus slate rejected and maintaining non-aligned support for their candidate, thereby guaranteeing a delay in the start of the Conference. The next few days saw an intensive, continuous round of negotiations by a handful of key individuals, while the vast majority of delegates could do nothing but wait for the Conference to begin. An informal group of about fifteen countries, including India and New Zealand, was organized to provide the focal point for negotiations. Many informal meetings of regional and ideological groups, including a group of Western countries in which the U.S. actively participated, were held during this period. The breakthrough came when the Latin American group was asked to provide a candidate for Chairman since the non-aligned, Arab and African groups would not propose a name acceptable to the Western group. The resulting compromise included Severini of Argentina as Chairman, proposed not as a non-aligned candidate but as a Latin American, and Kieffer as a special Vice-Chairman to coordinate the activities of Committees 4, 5 and 6. The 1979 WARC held its first plenary three days later than intended, adopting the proposed slate by consensus.

D. On other issues the situation regarding North-South relations was considerably more complex. A few developing countries clearly arrived at the Conference with a confrontational attitude. Their rhetoric at non-aligned preparatory meetings and in various regional forums gave an early indication that they were set to do battle at the Conference. While their numbers were few, their voices were often heard and influential. The majority of developing nations apparently were not looking for a confrontation and indeed generally remained silent in debates. Nevertheless, there appeared to be a feeling among developing nations that their solidarity must be maintained. It was only through the traditional ITU concept of reaching decisions by consensus rather than mere majority rule, combined with delegation perseverance in seeking solutions acceptable to all Members, that bloc voting was not more prevalent. The Delegation found the majority of developing country representatives willing to work with us on many issues, and received support from many of them on a wide variety of issues, both orally in the conference sessions and behind the scenes.

E. There were several general principles that appeared to characterize the positions taken by developing countries throughout the Conference. An obvious objective was to gain preferential treatment for themselves as shown, for example, in the Algerian proposal to give priority to developing countries in 70% of the HF fixed bands. This principle was also evident in a number of resolutions, recommendations and specific changes to the regulations where the Conference recognized the special needs of developing countries. Closely related was the forceful and relatively successful effort by developing countries to achieve a guarantee for access to congested frequency bands and geostationary orbit resources. WARC took initial steps in this direction in its adoption of resolutions calling for planning of the HF broadcasting bands and of the space services and use of the geostationary orbit.

F. In the area of allocations, developing countries typically refused to recognize or appreciate the requirements and existing investments of certain advanced systems such as U.S. military radar, and in some cases attempted to eliminate or reduce the allocation provisions. At the same time, they refused to accept even small changes in many bands that might have any effect on their existing operations. Another general trend that caused some difficulty was the obsession by many developing nations to add Fixed and Mobile Services to allocations in the higher bands up to 30 GHz. This tendency was a primary contributing factor to the large increase in the number of footnotes in the Table of Frequency Allocations. Finally, a constant source of exasperation in the North-South relationships was the unwillingness of the developing nations to link decisions on various issues or accept the notion of a "package deal". When attempts were made to establish linkage between U.S. concessions in one area to developing country concessions in another, their usual reply was that the advanced nations had the necessary technology to find some other solution. It eventually became clear that the major hope for gaining acceptance of some U.S. positions was to remain firm in detailed negotiations. This approach proved to be successful in certain situations where developing countries were reluctant to show any willingness to compromise.

G. East-West relations were remarkably good throughout the Conference, due mainly to two factors. First, the Chairman and Vice Chairmen of the Delegation had met twice with their counterparts on the Soviet Delegation before the opening of the Conference (Moscow, in September 1978 and Washington, in May 1979). These meetings were useful in establishing a rapport as well as giving both sides a clearer understanding of each country's position. Second, the state of telecommunications development of both nations, especially in the higher frequency bands, has many similarities. We naturally share like concerns in space activities and our defense communications requirements are roughly the same. The ability to work together, therefore, grew out of a common technical perspective of our communications needs in the future, reinforced by a strong desire on both sides to preserve the essential structure of the ITU.

VII. REPORT OF THE WORK OF THE COMMITTEES

A. Work of Committee 1 - Steering Committee

1. According to the usual practice, the Chairman of the Conference served as Chairman of the Steering Committee with substantial assistance and advice from the Secretary General of the Union. The Vice-Chairmen of the Conference and the Chairmen and Vice-Chairmen of all other committees made up the balance of the membership.

2. Committee 1 met each Thursday at the end of the day to consider matters relating to the direction of the Conference, such as deciding on the meeting schedule for the following week and on the need for weekend and evening meetings. The main decision of the Committee concerned the need to extend the Conference for several days. Otherwise, activities were uneventful. In accordance with custom, attendance was limited to the membership and the ITU staff designated as conference advisers and committee secretaries. No agenda or minutes were published.

B. Work of Committee 2 - Credentials Committee

1. The Committee established Working Group 2A to examine in detail the credentials deposited at the Conference. The Chairman and Vice-Chairman of the Committee and delegates from Algeria, the Federal Republic of Germany, Colombia, Hungary and Thailand participated in the Working Group, which met three times during the Conference. There were no political issues raised at the Working Group level.

2. Summary of Results:

a. Committee 2 met two times during the Conference. At its final meeting it found the credentials of 126 delegations (including the U.S.) to be in order and since they had ratified the Malaga-Torremolinos Convention, they could vote and sign the Final Acts of the Conference. Another two delegations — Bolivia and Panama — deposited provisional credentials found to be in order; therefore they could vote but not sign the Final Acts.

b. The following nine countries submitted valid credentials, but either had not ratified the Convention or were over two years in arrears on payments to the ITU; these delegations could not vote, but they could sign the Final Acts:

Guatemala
Democratic Kampuchea
Liberia
Mauritania
Nicaragua
Sierra Leone
Sudan
Chad
Zaire

c. The following six countries did not deposit credentials; these delegations could neither vote nor sign the Final Acts:

Central African Republic
Djibouti
Dominican Republic
Maldives
Mauritius
Nauru

(Note: the inconsistency between the number of countries given in this section and the number appearing in Part IV (Participation) and Annex A arises because the Kingdom of Tonga submitted valid credentials, yet did not participate in the Conference or appear on the final list of participants.)

3. There were only two political controversies regarding credentials, and they were raised in Committee 2 rather than Plenary.

a. The credentials of Democratic Kampuchea (CBG) were attacked by several delegations. Hungary questioned the validity of CBG's credentials on the basis of Article 67 of the Convention and that their Foreign Minister had signed them in New York, rather than in Kampuchea. The ITU legal advisor ruled that the place of signing was immaterial. Cuba, supported by Nicaragua, questioned the credentials and participation of the Kampuchean delegation. The USSR, DDR, Poland, Ukraine, Mongolia, Byelorussia and Bulgaria strongly protested the acceptance of CBG's credentials. Supporting the validity of Democratic Kampuchea's credentials were China, Thailand and the United States. The U.S. Delegation made it quite clear that it was only endorsing the validity of the credentials and not inferring support for either the Pol Pot or Heng Semrin regimes. In the end, the credentials of Democratic Kampuchea were accepted, although they could not vote for reasons given in 2b above.

b. The second political problem involved a challenge by the USSR delegate to the legitimacy of certain FRG delegation members who resided in West Berlin. They put forth the specious argument that under the Quadripartite Agreement (QA) these individuals were not allowed to represent the FRG. The USSR was supported by most of their allies in Eastern Europe. The U.S. Delegation made a statement, coordinated with the FRG and the UK, which pointed out the USSR had made incomplete and misleading reference to the QA, and went on to quote the appropriate passage of the Agreement to support our position. The FRG also vocally supported our statement in the Committee 2 meeting. In the end, the Committee took note of the USSR's concern, but supported the U.S. position.

C. Work of Committee 3 - Budget Control Committee

1. The Committee met six times, noting at its last meeting that no delegation had presented any criticisms of the organization and facilities available to the delegates.

2. The Conference budget approved by the Administrative Council at its 33rd (1978) and 34th (1979) Sessions provided 5,234,000 Swiss francs for the work of the Conference itself (1979 budget) and 240,000 Swiss francs for finalization work (1980 budget), for a total of 5,474,000 francs. The Committee also noted that the Conference budget did not include expenses relating to common services, which are now charged to a special section of the ordinary budget. The portion relating to the 1979 WARC in this section was estimated at 3,026,600 Swiss francs.

3. The Committee's final report, approved by Plenary on November 28, indicated a total estimated expense of 5,378,000 francs for the work of the Conference. The estimated excess of 144,000 francs was approved by the Plenary. All of the excess expenditure was due to the extension of the Conference for six days. It is commendable that other expenses were held to the budgeted amounts, despite the much larger volume of documentation than predicted and the many additional interpretation days which had to be provided.

4. Following the Conference, the Secretary General reported that actual expenses for the Conference amounted to 5,318,917.25 Swiss francs and the actual excess expenditure was only 84,917.25 francs.

D. Work of Committee 4 - Technical Regulations Committee

1. The work of Committee 4 was divided among three major Working Groups: 4A - Definitions and Nomenclature; 4B - Space/Terrestrial Sharing and Coordination Problems; and 4C - All Other Technical Standards. The excellent Report of the CCIR Special Preparatory Meeting was used extensively during the work of the Technical Committee. U.S. objectives met with great success in this area. The only major U.S. technical proposal that was not adequately accommodated by the Conference dealt with the 10 dB relaxation of the broadcasting satellite power flux density limit in the 2.5 GHz band.

2. The United States objectives with respect to the technical regulations were governed by the following general principles: changes to the Radio Regulations should result in more efficient spectrum and orbit utilization, and a flexible approach should be used to meet the needs of all administrations. A summary of our specific objectives and the Conference results is as follows:

a. Technical Terms and Definitions

The U.S. position was that changes to definitions in the Radio Regulations should be minimized unless they are essential. Therefore, the only changes proposed were to the terms dealing with coordination distance, contour, and area to recognize the procedures relevant to the Mobile Satellite Service contained in our proposed new Appendices 28A and 28B. The Conference did not accept the definition changes after rejecting the new Appendices.

The Technical Committee spent substantial time, however, in their consideration of the definitions contained in Sections V and VI of Article N1. The overall structure and organization of Article N1 was changed by the Conference. Committee 4 adopted many new definitions, most of which came from the SPM Report and other CCIR work. In a new section entitled Frequency Sharing, four new terms were defined, i.e., interference, permissible interference, acceptable interference, and protection ratio. There was considerable discussion on the term harmful interference in relation to permissible interference, but the former was approved without substantial change. Twelve new definitions were adopted in the section dealing with emissions and equipment characteristics, including terms for radiation, emission, class of emission, single sideband emission, out-of-band emission, and unwanted emission. The first two were the subject of intense discussion as to their use, appropriate meaning and suitable texts for the three languages. Regarding technical terms relating to space, new definitions were adopted for active sensor, passive sensor, and geostationary satellite orbit. Some terms were modified including a change of passive satellite to reflecting satellite and expansion of the definition of geostationary satellite. The Committee did not have sufficient information to decide on definitions for service area, coverage area, and channel, and therefore adopted recommendations for CCIR study of these terms.

Article N2 concerning Nomenclature of the Frequency Bands remained essentially unchanged. There was a strong effort to expand the list of bands up to 3,000 THz (THz equals 10^{12} Hertz) for reference purposes, noting that optical systems are being considered above the upper limit of 3,000 GHz now shown in the list. This proposal was rejected for the Regulations since sufficient guidance is given in the CCIR texts.

b. Classification and Designation of Emissions and Necessary Bandwidth

Within the existing Radio Regulations, Article N3 and Appendix B required the use of three symbols to classify and describe the emission, preceded by the necessary bandwidth in kilohertz. Because these provisions for designating emissions were adopted at a time when many of the present complex signals were not yet in use, they did not provide the means for expressing all of the information necessary to describe the newer emissions. Furthermore, the emission designator is important in the evaluation of interference potential since it is the only information available in some cases by which the purpose and content of a signal can be determined.

The CCIR had considered all emissions and characteristics requiring classification and had developed a detailed procedure for the designation of emissions. This procedure, contained in Recommendation 507, was adopted by the CCIR XIVth Plenary (Kyoto, 1978) and forwarded directly by that Plenary Assembly to the 1979 WARC. This Recommendation was also accepted by the SPM and was contained in the U.S. proposals to the Technical Committee, together with necessary changes to Appendix 5. However, the SPM expressed concern that the Appendix would not reflect current technology. In addition, examples were incomplete for composite emissions (A9, F9 and P9) whose numbers and complexity have increased significantly. Therefore, the SPM agreed that this matter requires further CCIR study and noted that necessary bandwidth may be determined by any one of three ways, viz., use of the revised Appendix 5, computation in accordance with CCIR Recommendations or by measurement. The SPM also considered that the revised emission designation procedure adopted for Appendix 5 by the 1978 CCIR Plenary is appropriate. These were contained in our proposals to the WARC.

The Conference adopted the CCIR Recommendations and therefore the U.S. proposals for the classification and designation of emissions for Article N3 and Appendix 5. The new method provides a more precise and descriptive way of specifying transmissions, allowing more efficient use of the spectrum by improving international frequency registration techniques and more accurate determination of interference potential when planning new systems in shared frequency bands. The CCIR was requested in new Recommendations K and M to continue their study of these issues.

Committee 4 also adopted Resolution AK which directs the IFRB to prepare and publish, not later than October 1980, explanatory information to help implement the new method. Conversion of the Master Frequency Register to the new designation system is to begin as soon as administrations begin forwarding necessary data. This exercise will be one of the first tasks that the responsible U.S. agencies will have to undertake.

c. Technical Characteristics

Article N4 contained several basic regulations which were applicable to transmitting and receiving equipments. Changes were proposed to enhance spectrum efficiency by urging the use of new technology, including for the first time guidelines for receiving equipment, as set forth in relevant CCIR Recommendations. The SPM results supported these modifications. Specific improvements were proposed in Appendices 3 and 4 which are discussed below.

d. Frequency Tolerances of Transmitters

Frequency tolerances of transmitters in many instances affect the efficiency with which radio spectrum is used as well as the design, cost, and operation of radio systems. Appendix 3 and Article N4 of the Radio Regulations established the frequency tolerances for transmitters. The tolerances were developed for equipment that had been in use for many years. Advances in technology, increases in costs of equipment, and differences in method of operation suggested the need for changes to the criteria on which the tolerances were developed. Hence, the U.S. undertook a comprehensive study of the frequency tolerances for the various types of equipment in use. During the development of the proposed tolerances, the study recognized the influence that a new tolerance would have on spectrum efficiency and took into account the economic and operational cost associated with such changes. Also, it was considered important that new restrictive tolerances not be based solely on the state of the art of the equipment. In some instances, the improvement of spectrum efficiency was not great enough to offset the cost of making the transition and in those cases the tolerances were not proposed to be changed. The U.S. presented the results of this study and associated justifications for the proposed changes to the SPM and nearly all were accepted. The U.S. proposal to the WARC was to revise Appendix 3 using values in the SPM Report.

Values of frequency tolerances recommended by the SPM were essentially adopted without change by the 1979 WARC. A few tolerance values were relaxed internationally although there was a strong tendency to stay exactly with the SPM values. In one case, however, a frequency tolerance tighter than the SPM recommendation was adopted, which will affect U.S.-licensed transmitters in the Land Mobile Service operating with 2 watts or less (generally walkie-talkies). This involves the band 235-470 MHz where a frequency tolerance of 15 parts per million was decided for portable equipment with mean output power of 5 watts or less. The present U.S. tolerance for some services in this band is 50 parts per million. The new tolerance value takes effect for all new transmitters after January 1, 1985 and for all 5 watt or less transmitters after January 1, 1990.

e. Spurious Emission Tolerance Levels

Spurious emission levels of transmitters have a definite relationship to the severity of unwanted interference signals that affect the operation of radio equipment in any electromagnetic environment. The reduction of these spurious emission levels can contribute significantly to the reduction of harmful interference from both in-band and out-of-band unwanted signals. The Table of Tolerances for the Levels of Spurious Emissions contained in Appendix 4 provided tolerances for transmitters operating below 235 MHz; for bands above this frequency, the U.S. believed that spurious emission levels should be as low as practicable.

The CCIR adopted a study program on this matter in which the U.S. took an active lead. The results of this effort were discussed at the SPM and acceptable conclusions were agreed as far as they went. Specifically, the SPM Table of Maximum Permissible Levels of Spurious Emissions ends at 960 MHz. The U.S. considered it important to extend the table upwards to 17.7 GHz. The inclusion of satellite operations in this frequency range was particularly important because of (1) the potential impact of satellites on terrestrial and other satellite communications systems; (2) the general inability to reduce or eliminate spurious emissions from launched satellites short of turning off the equipment; and (3) the expense associated with satellite operations. Based on data taken from satellite and other transmitter users and on an assessment of technology now under development, it was believed that a value of 50 dB below the mean power of the fundamental emission, without exceeding 100 milliwatts, was appropriate for all cases except for intermodulation problems associated with earth and space station emissions. For this case a value of 30 dB below the saturated transmitter output power without a 100 milliwatt limit was appropriate pending further CCIR study.

The U.S. proposal to the WARC therefore was to modify Appendix 4 in accordance with the SPM Report. In addition, the U.S. proposed that specific values be adopted for the frequency range between 960 MHz and 17.7 GHz. The 1979 WARC adopted changes to Appendix 4 and extended the table up to 17.7 GHz in accordance with our proposals. This decision increases the previous international upper frequency limit from 235 MHz except in the special case of stations in the space services and systems using digital modulation techniques in the bands above 960 MHz which require additional study. New Recommendation L requests the CCIR to carry out these studies as a matter of urgency. The higher frequency limit is not effective until 1994. There were essentially no changes below 235 MHz requiring specific U.S. action.

f. Interference and Tests

The Regulations on interference and tests were deemed sufficient and adequate by the U.S. Therefore, our proposal to the Conference was to maintain Articles N16 and N17 without modification. The Conference adopted minimal changes to these Articles. One new provision states that special consideration should be given to avoiding interference on the distress and safety frequencies. Another decision established a new section dealing with industrial, scientific and medical (ISM) equipment which was defined in Article N1. The new ISM provision was based on the existing regulation for industrial interference, and states that radiation from ISM equipment shall be minimal and that radiation shall not cause harmful interference to radiocommunications services outside of the bands designated for ISM use.

g. Terrestrial Services Sharing with Space Services

The increasing use of space services to satisfy the communications requirements of the world was recognized with the addition of new satellite service allocations and the consequential increases in sharing between space and terrestrial services. For shared frequency bands in the range 1-40 GHz, both the SPM Report and the U.S. proposals maintained essentially a status quo for Article N25 with respect to the direction of maximum radiation and the maximum equivalent isotropically radiated power (eirp) from stations in the Fixed and Mobile Services. For frequency bands above 40 GHz the population density of the terrestrial and space services in shared bands was not extensive, nor were the characteristics of equipment sufficiently known to warrant proposals for sharing criteria.

The Conference maintained the values for pointing restrictions without change in the bands 1-10 GHz and 10-15 GHz. For the bands above 15 GHz no pointing restrictions for the Fixed and Mobile Services were adopted in spite of pressure to do so. However, a footnote provision states that when the CCIR has made a recommendation as to the need for restrictions above 15 GHz, all systems introduced after January 1, 1982 should as far as possible meet such restrictions. Power limits for the bands 1-10 GHz and above 10 GHz were maintained without change. Appropriate changes were made in the list of specific bands to take into account changes in the Allocation Table, although the limits in the bands available to feeder links for the Broadcasting Satellite Service (i.e., 10.7-11.7 GHz, 14.5-14.8 GHz and 17.7-18.1 GHz) were made provisional pending further CCIR study. In recognition of the equality of right to operate when different services are allocated in adjacent regions, a footnote provision urges administrations to observe any limits concerning inter-regional interference which the CCIR may adopt.

h. Space Services Sharing with Terrestrial Services

In general, the U.S. proposals and the SPM Report maintained the status quo for all power flux density (pfd) values in Article N26. The single exception in the U.S. proposals concerned the Broadcasting Satellite Service allocation at 2.5 GHz. Appropriate changes were, of course, necessary to add or delete specific bands to the applicable power limit to reflect decisions taken on the Table of Frequency Allocations.

In the band 2500-2655 MHz, the Broadcasting Satellite Service (BSS) and the Fixed Satellite Service (FSS) (space-to-earth), as proposed for Region 2, would share the frequency band with the terrestrial Fixed and Mobile Services. The Regulations in Article N26 provided a higher power flux density limit for BSS than for FSS. The U.S. proposed that the pfd limit for these two services be the same in this frequency band, believing that there was no justification for burdening the Fixed Satellite Service with a lower pfd limit if it must operate within the same environment as the Broadcasting Satellite Service. In addition, it was envisioned that BSS in this frequency band would develop using earth stations with small diameter antennas (about 1 meter) at least for domestic use as demonstrated by the ATS-6 experiment. Hence, the United States further proposed that the existing Broadcasting Satellite Service pfd limit be relaxed by 10 dB and be applied to both BSS and FSS. This would accommodate the smaller diameter earth terminals.

The U.S. Delegation encountered surprisingly strong opposition to our proposals for BSS and FSS power limits in the 2.5 GHz band. An extensive effort was made to explain the issue to other delegates, including the distribution of a formal document on the subject. Support of the developing countries was sought on the basis that the changes proposed were particularly beneficial for low capacity integrated BSS/FSS systems such as that demonstrated in the SITE project using the ATS-6 satellite. This effort was not successful. After extensive discussion with many administrations, the Conference rejected the proposal for a 10 dB relaxation of the pfd applicable to the Broadcasting Satellite Service. It was possible to align the pfd limits for the Fixed Satellite Service to those which currently exist for the BSS (this represents a 2 dB relaxation at high elevation angles and 7 dB at low angles). In addition, pfd limits were adopted to reflect changes to the downlink allocations for the FSS, which were extended from 2500 MHz to 2690 MHz in Region 2 with the upper 35 MHz allocated for bidirectional use.

The Conference maintained all other power flux density limits in Article N26 without change. New pfd limits were adopted for the band 31-40.5 GHz on a provisional basis pending further CCIR study. As in the case of Article N25 a footnote provision was adopted urging administrations to observe any limits concerning interregional interference which the CCIR may adopt, in recognition of the equality of right to operate between Regions.

i. Special Rules for Space Services

One area in which the Conference could improve the utilization of the geostationary orbit was in the regulations specifying the accuracy of spacecraft stationkeeping and antenna pointing. The subject of stationkeeping was discussed at the

SPM and its Report concluded that it is now technically feasible for new geostationary satellites to be controlled in longitude plus or minus 0.1°. The U.S. supported this conclusion in its proposals and also proposed tightening the pointing accuracy requirement to plus or minus 0.1°.

Committee 4 adopted stationkeeping requirements proposed by the U.S. for the FSS and BSS services. Longitude capability and maintenance was changed from plus or minus 1° to plus or minus 0.1°. Experimental stations and space stations in services other than FSS and BSS need maintain their position only within plus or minus 0.5°. A grandfather clause provides that space stations in service before January 1, 1987 and advance published before January 1, 1982, may comply with the existing values but should make an effort to achieve a maintenance capability of plus or minus 0.5°. Pointing accuracy requirements were increased but not to the extent desired by the U.S. The Conference adopted values of plus or minus 0.3° or 10% of the half-power beam width, whichever is greater, for all geostationary satellites.

Another item of interest in Article N27 is the priority given to FSS geostationary satellites over non-geostationary satellites. Some administrations wanted this priority to be extended to all space services but the U.S. successfully opposed the idea because of its overly restrictive impact on non-FSS services. A new section relating to Radioastronomy in the shielded zone of the Moon was added to the Article. The new provisions prohibit emissions causing harmful interference to radioastronomy observations on the far side of the Moon in the entire frequency spectrum, except for bands allocated to or used in support of the Space Research Service.

j. Aeronautical Radiobeacons

A requirement to increase the protection ratio for aeronautical radiobeacons operating in the LF/MF range was identified by the International Civil Aviation Organization (ICAO) and supported by the U.S. For some time, these beacons had been protected in practice at a 15 dB level, instead of the 10 dB as indicated in Article N33. At the ICAO Communications Divisional Meeting in the Spring of 1978 it was unanimously agreed that the Radio Regulations should be changed to provide a protection ratio of 15 dB. This action was taken by the 1979 WARC.

k. Determination of Coordination Areas

The U.S. proposed to simplify the calculations of Appendix 28 which specify the procedure for determining the coordination area around an earth station. As written, Appendix 28 calculations were complex and were based upon permissible interference power. For earth stations dedicated to reception of video or digital (excluding telephony) transmissions, reception quality could be based upon an acceptable received carrier-to-interference (C/I) ratio. The use of an alternative procedure based upon an acceptable C/I ratio would considerably simplify the calculations.

The 1979 WARC modified Appendix 28 to permit simplified calculations for determining the coordination area around an earth station. Although a procedure specifically based on C/I ratio was not adopted as proposed by the U.S., such a procedure is now permitted for optional lower protection for receiving earth stations. An administration is free to use any procedure it wishes to calculate coordination contour to protect transmissions to its earth stations provided that the coordination contour is smaller than that which would result from normal Appendix 28 calculation methods. However, when a smaller coordination contour is based upon a procedure other than the procedure contained in Appendix 28, the notifying administration shall indicate in detail the nature of such procedures. If an administration later decides to protect its receiving earth stations through notification of a coordination contour which is greater than the one it had notified under a departure from Appendix 28, it must re-coordinate the earth station.

The Technical Committee also modified Appendix 28 to include propagation data from CCIR Reports, but with significantly and arbitrarily reduced cutoff distances. This may pose a problem in the future with respect to overland paths. In addition, the Conference adopted Resolution AJ providing an update of the Appendix 28 propagation data following each future CCIR Plenary Assembly (approximately every four years). Changes to the Appendix would be adopted at the next scheduled WARC under an extraordinary agenda item.

In recognition of the growing use of mobile satellite systems, the U.S. proposed a procedure in new Appendix 28A for determining the coordination area above 1 GHz associated with the operation of mobile earth stations. By building upon procedures contained in Appendix 28, provisions contained in the new Appendix 28A would permit the calculation of a coordination area around the service area within which it is desired to operate a mobile earth station. Whereas the coordination of an earth station in the Fixed Satellite Service was for a single site or one geographic location, coordination of an earth station in the Mobile Satellite Service would permit the mobile earth station to operate at any location within the specified service area. Additionally, a new Appendix 28B was proposed that provides an optional procedure for determining the protection area around a terrestrial station located within the coordination area of an earth station in the Mobile Satellite Service.

U.S. proposals relating to mobile satellite earth station coordination procedures were introduced into the Radio Regulations in modified form. The Final Acts incorporate the philosophy contained in the proposed Appendix 28A into Section 7 of Appendix 28 which provides recognition of a specialized coordination area. The proposed Appendix 28B met with strong opposition and was rejected. Additionally, Regulation No. 4139 was modified to note mobile earth stations, as well as stating that the coordination procedures "shall be subject to agreement . . . between the administrations concerned". In this way, modifications to Appendix 28 and Regulation No. 4139 achieved the U.S. goals.

1. Coordination between Satellite Networks

Appendix 29 prescribed procedures for determining when coordination between satellite networks was necessary. In general, the approach provided in Appendix 29 was considered adequate. However, experience in applying these provisions indicated that the specified 2% increase in noise temperature was too conservative and led to the initiation of coordination in an unnecessarily large number of cases. In order to reduce the number of instances where coordination is required, the U.S. proposed that the increase in noise temperature criteria be revised upward to 3%. This was consistent with the conclusions of the SPM Report on this issue. The U.S. also proposed to change the title of the Appendix, to clarify that the procedure serves as a "trigger" to determine when the coordination should be initiated rather than a method to determine the degree of interference.

The Conference raised the noise temperature criteria for determining if coordination is required between geostationary satellite networks to 4% from the existing 2% value which is consistent with U.S. efforts to minimize the number of situations where coordination is required. The title of the Appendix also was modified in line with the U.S. proposal to more accurately indicate the purpose of the Appendix.

Other changes to Appendix 29 were acceptable to the U.S. They include new provisions for reversed-frequency band usage and the concept of a single link (up or down). New reference antenna radiation patterns were adopted. The Delegation successfully opposed proposals for the automatic use of polarization isolation and for a special calculation method to protect single channel per carrier (SCPC) from artificially dispersed FM/TV transmissions.

m. New Recommendation

It was proposed by the U.S. that footnote 3661/332A be modified so that the band 620-790 MHz would be available to sound as well as television broadcasting in the Broadcasting

Satellite Service. Further, it was proposed that the power flux density limits be deleted. In consideration of these modifications, a new Recommendation FF was proposed replacing Recommendation No. Spa2-10 and expanding its provisions to have the CCIR study the effects of the various broadcasting satellite emissions upon the terrestrial Broadcasting Service. The SPM treated this subject and its Report supported the U.S. objectives. In Committee 5, the proposals to modify footnote 3661/332A were not accepted. The U.S. withdrew its Recommendation FF and Committee 4 adopted Recommendation No. Spa2-10 without change.

The Technical Committee also reviewed a large number of existing resolutions and recommendations, many of which were retained with little or no change. In addition, there were a significant number of new resolutions and recommendations adopted that were primarily directed to the CCIR and the need for further study.

E. Work of Committee 5 - Frequency Allocations Committee

1. Introduction

The Allocations Committee carried out its work in six main Working Groups, with responsibility for the entire Table of Frequency Allocations, the Regulations relating to the Table and the use of frequencies, and the definitions relevant to the various radio services. It considered and decided on nearly 13,000 individual proposals in the course of its work. Due to the fundamental importance of allocations, all delegations including the U.S. participated in Committee 5 more than any other, which led to well-attended meetings that were often as large as the Plenaries themselves. The work ranged from meticulous plodding through the lower bands to stormy debate concerning the Fixed Satellite Service at 3 and 4 GHz. In the end, the resulting Table of Frequency Allocations could be considered a success, even though the total of 487 footnotes represented a net increase of 117 above the number in the existing Table and notwithstanding the fact that the United States found it necessary to take five reservations on decisions made by the Committee. There were hundreds of major decisions taken over the period of the Conference and nearly all were arrived at by general consensus that was fully acceptable to the U.S. position. The overall and specific results are highly favorable to the United States. The following paragraphs provide a brief summary of our objectives and the work of the Allocations Committee.

2. Allocations in the Bands Below 4,000 kHz

a. The U.S. proposals in the Table of Frequency Allocations below 4,000 kHz were generally intended to provide increased status and protection for certain existing services and to provide additional allocations for radio services with frequency requirements that have increased since the 1959 Radio Conference, reducing other allocations appropriately. The Conference adopted many changes to the Table but it did not undergo major change. The main results, particularly in Regions 1 and 2, were to improve conditions for sharing by the Radiolocation, Radionavigation, Amateur and Maritime Mobile Services, and to expand the bands for the Broadcasting Service. The Conference confirmed the regional character of the Allocation Table below 4 MHz.

b. The first change to the Allocation Table was to move the lower limit from 10 kHz to 9 khz, supposedly to benefit radionavigation systems in the band 10-14 kHz although the U.S. did not consider it necessary. The band below 9 kHz is not allocated and the existing footnote requiring protection from harmful interference to systems in the allocated bands was retained.

c. The U.S. proposed changes to improve the allocation status of the worldwide OMEGA (10-14 kHz) and the LORAN-C (90-110 kHz) radionavigation systems. Radionavigation now has a primary exclusive allocation worldwide in the band 9-14 kHz. The band 90-110 kHz has been reserved for the primary use of the Radionavigation Service worldwide, the other services having been reduced to secondary status. This band is protected by a footnote from interference caused by emissions in adjacent bands. A footnote has also been added to improve the use of the band through coordination of the technical characteristics and of operation of the system used.

d. New primary allocations were proposed for the Aeronautical Radionavigation Service below 200 kHz and above 510 kHz to accommodate radiobeacons. Also, in agreement with the U.S. proposals and the SPM Report, shared allocations were proposed in Region 2 for aeronautical beacons and low-power broadcasting stations in the band 525-535 kHz. All proposed allocations for the Aeronautical Radionavigation Service were obtained. Secondary allocations for maritime radiobeacons were sought in the bands 275-285, 325-335, and 510-525 kHz. However, only the second band was adopted by the Conference.

e. In Region 1 between 150 and 285 kHz the allocation to the Broadcasting Service was improved by reducing the allocations to the Aeronautical Radionavigation Service. The band limits have been altered from 150-285 kHz to 148.5-283.5 kHz to permit the change of frequency of all broadcasting stations so that carriers will be multiples of the channel separation (9 kHz). Resolution BS was adopted providing that the frequency changes shall take place over a period of four years from February 1, 1986 to February 1, 1990 to ensure minimum possible interference to Aeronautical Radionavigation Service in Regions 2 and 3. Between 285 and 435 kHz in Region 1, the status of aeronautical radionavigation was improved to compensate for the reductions imposed below 285 kHz.

f. Where possible, allocation changes were proposed that take advantage of the improved performance of existing radio equipment as well as those anticipated in the future, as in the case of the reduced guard bands for the 500 kHz and the 2182 kHz mobile distress and calling frequencies. The guard band for 500 kHz has been reduced from 490-510 to 495-505 kHz. Recommendation ZZ was adopted inviting the next Mobile Services Conference to decide on the date of entry into force of the new guard band at 500 kHz. The Conference also adopted Recommendation YD providing that the use of the bands between 435 and 526.5 kHz by the Maritime Mobile Service in Region 1 shall be regulated by a plan to be prepared at that Conference. Recommendation YB calls for the next Mobile Conference to consider the possibility of allocating a frequency between 435 and 525 kHz for transmission on a worldwide basis of navigational and meteorological warnings to ships using narrowband direct-printing telegraphy.

g. The U.S. proposed that the broadcast allocations in the two bands 525-535 kHz and 1605-1615 kHz used domestically for the Travelers Information Stations (TIS) be limited to public service information and restricted to a maximum transmitter power of 50 watts. The broadcasting allocations were adopted but the Conference did not agree to the power restrictions. In the lower band, the WARC adopted a power limit for AM-broadcasting stations of 1 kw daytime and 250 watts nighttime. The upper band has become part of the new AM-broadcasting band, without power limits and subject to regional planning. Decisions will have to be made on the best way to accommodate the TIS requirement under the new allocations.

h. The U.S. proposed additional MF spectrum for broadcasting in Region 2 to permit an expansion of the number of AM-broadcasting stations in this country. Our proposal would have provided shared allocations in the band 1605-1800 kHz, and exclusive broadcasting at 1800-1860 kHz. The total spectrum available for broadcasting under this proposal would have been less than the total increase because of the need to satisfy other requirements, primarily the Radiolocation Service, in the same spectrum area. The WARC adopted a broadcasting allocation in the band 1605-1705 kHz. The use of this band for broadcasting is subject to a broadcast plan to be established by a Region 2 Conference which will take place not later than 1985. Prior to the establishment of such a plan, the band 1605-1705 kHz is allocated to the Fixed, Mobile and Aeronautical Radionavigation Services on a primary basis and to the Radiolocation Service on a secondary basis. After the plan comes into effect, the band 1605-1625 kHz will be exclusively broadcasting and the band 1625-1705 will be allocated to broadcasting on a primary basis, fixed and mobile on a permitted basis, and radiolocation on a secondary basis.

The Conference also recommended that the use of the band 1625-1665 kHz for broadcasting should not commence before July 1, 1987 and the use of the 1665-1705 kHz band for broadcasting should not commence before July 1, 1990. This phased-in approach will give administrations in Region 2 that have fixed and mobile operations in the band sufficient time to move these operations. The U.S. has substantial radiolocation operations in this band that will have to be reaccommodated over a period of time. These operations will either have to be moved or accommodated domestically on a shared basis with the Broadcasting Service. Such sharing would likely be ineffective near international borders since the Radiolocation Service is on a secondary basis.

i. The proposed broadcasting allocations at 1800-1860 kHz were not adopted by the WARC. Instead, an exclusive allocation for the Amateur Service was made in the band 1800-1850 kHz in Region 2. The Radiolocation Service was given a primary allocation at 1850-2000 kHz shared co-equally with several other services. Also, LORAN stations in Region 2 operating in the radionavigation band 1800-2000 kHz are to be discontinued by December 31, 1982.

j. In Regions 1 and 3 the limits of the bands used by the Broadcasting Service have been changed from 525 and 1605 kHz to 526.5 and 1606.5 kHz respectively. In Region 1, allocations above 1606.5 kHz to the Maritime Mobile Service have been improved. This Service is now the only primary service in Region 1 in a number of bands so that it will be possible to plan them. The bands are: 1606.5-1625 kHz, 1635-1800 kHz and 2045-2160 kHz. Also, for a number of countries in Region 1, the Maritime Mobile Service's status as the single primary service has been extended by means of a footnote to the bands 2194-2300 kHz, 2502-2625 kHz and 3155-3200 kHz. The use of these bands by maritime will also be the subject of a plan to be drawn up by the next Mobile Conference.

k. In Region 1 three bands have been exclusively allocated to radiolocation, i.e., 1625-1635 kHz, 1800-1810 kHz and 2160-2170 kHz. The use of these bands by the Radiolocation Service is subject to coordination between users and to a power limitation. Also in Region 1, the band 1810-1850 kHz has been allocated exclusively to the Amateur Service.

l. The Conference added a footnote to the Table urging administrations to authorize the use of the band 3155-3195 kHz to provide a common worldwide channel for low power wireless hearing aids designed to operate over short distances within the induction field. The footnote indicates that other channels may be assigned from the band 3155-3400 kHz to suit local needs.

m. The U.S. proposed an exclusive allocation in Region 2 for the Amateur Service, in the band 3500-3900 kHz. However, the Conference only approved an exclusive band from 3500-3750 kHz. A new footnote was added to all Amateur Service bands between 3.5 and 144 MHz regarding the use of the bands in the event of natural disaster. The conditions of use for this purpose are given in new Resolution DN.

3. Allocations in the Bands 4-27.5 MHz

a. The U.S. proposed changes in the high frequency band to meet the expanding needs of the Broadcasting, Maritime, Amateur, Mobile and Radioastronomy Services with a minimum of impact on the Fixed Service, consistent with the changing role of the latter service in world communications. It was recognized that many countries will have a continuing need for HF domestic fixed communications for a number of years. It was felt that fixed satellite, microwave systems and/or cables eventually will meet requirements for dependable long distance national fixed circuits in nearly all countries.

Congestion in the high frequency broadcasting bands has reached the point where effective broadcast reception can be assured only through the use of excessive transmitter power and multiple transmitters. The increased communications traffic stemming from international trade required an increase in the allocations of the HF Maritime Mobile Service if communications were to improve shipping efficiency and decrease cost. New allocations for broadcasting and maritime mobile expansion were proposed in such a manner as to have minimum impact on the Fixed Service. The new bands were proposed to be shared with the Fixed Service which would be continued for national operations with new footnotes. This recognized the fact that the greatest continuing requirement for fixed operations is national rather than international. It was also proposed to add broadcasting allocations by the addition of footnote 3496/202 (Tropical Zone) in several of the lower HF bands. This would have the effect of allowing new broadcasting operations on a priority basis in these bands. New allocations for the Mobile (except Aeronautical Mobile (R)) Service were proposed on a shared basis in certain fixed bands to provide for mobile requirements in general.

b. The Delegation anticipated difficulties in achieving allocation increases in the Broadcasting and Maritime Services at the expense of the Fixed Service and such difficulties were experienced, particularly in the lower HF bands. Very few changes to the allocations of the Fixed Service were made below 10 MHz, as a result of the strong desire of many countries to continue to use the high frequency Fixed Services mainly for domestic communications systems. In summary, of the Fixed Service spectrum between 4 and 10 MHz, 125 kHz was reallocated. Increased sharing was provided on a primary basis in 578 kHz in Region 1, 678 kHz in Region 2 and 358 kHz in Region 3. Sharing by other services on a secondary basis has been provided in 1225 kHz in Regions 1 and 2 and 1545 kHz in Region 3. In the bands between 10 and 27.5 MHz, significant reallocations of spectrum from the fixed bands were made in favor of the Maritime Mobile, the Broadcasting and the Amateur Services. However, the band 21,850-21,870 kHz, which will be vacated by the Radioastronomy Service, has been reallocated to the Fixed Service.

c. The only significant reallocation below 10 MHz was made from the Fixed Service to the Broadcasting Service in the band 9775-9900 kHz. The availability of this band to the Broadcasting Service is dependent on the satisfactory transfer of existing fixed operations. Other changes involve increased sharing between the Fixed Service and the Maritime and Mobile Services. In particular, the Maritime Mobile Service has been added on an equal primary basis with the Fixed Service in the bands 4000-4063 kHz and 8100-8195 kHz. The U.S. Delegation found it necessary to submit reservations (see also Section XII) in the Final Protocol regarding the failure of the Conference to provide adequate allocations for the Broadcasting and Maritime Mobile Services in this part of the spectrum.

New allocations for the Mobile (except Aeronautical Mobile) or Land Mobile Services sharing with the Fixed Service have been established in several bands on a worldwide or regional basis. The allocations were made on a primary or secondary basis in the bands 4750-4850 kHz, 5060-5250 kHz, 5250-5450 kHz, 5730-5950 kHz, 6765-7000 kHz and 7300-8100 kHz.

d. Additional spectrum above 10 MHz for the Maritime Mobile Service was provided for in the bands 12,230-12,330 kHz, 16,360-16,460 kHz, 17,360-17.410 kHz, 18,780-18,900 kHz, 19,680-19,800 kHz, 22,720-22,855 kHz, 25,110-25,210 kHz and 26,100-26,175 kHz. These reallocations, which total 800 kHz, will be available under the conditions specified in Footnote 3511A, which provides for the transfer of the existing services operating in these bands in accordance with the Table of Frequency Allocations and which are recorded in the Master Register. The Conference also approved the detailed procedures and the time scale for effecting the transfer of the Fixed Service assignments. For the bands above 10 MHz, the transfer period is to be five years from July 1, 1984. The use of these bands shall also be subject to provisions to be decided by a competent WARC, and the earliest date for maritime use shall not be earlier than the satisfactory completion of the transfer of Fixed Service assignments.

e. The Broadcasting Service bands have been increased under conditions that are similar to those governing the transfer of bands to the Maritime Mobile Service. A total of 725 kHz of new spectrum is to become available to the Broadcasting Service in the bands 11,650-11,700 kHz, 11,975-12,050 kHz, 13,600-13,800 kHz, 15,450-15,600 kHz, 17,550-17,700 kHz, and 21,750-21,850 kHz. Footnote 3510A sets out the conditions under which the above bands may be used by the Broadcasting Service. This Footnote also refers to the band 9775-9900 kHz reallocated to the Broadcasting Service below 10 MHz. The same transfer time period mentioned above for the Maritime Mobile Service applies to the Broadcasting Service. For the band below 10 MHz, the transfer period is to be ten years from July 1, 1984. The use of these bands is also subject to provisions to be decided by the WARC for Planning HF Bands Allocated to the Broadcasting Service, called for by Resolution DI.

f. The Amateur Service was allocated additional bands at 10,000-10,150 kHz on a secondary basis, 18,068-18,168 kHz on an exclusive basis including amateur satellite, and at 24,890-24,990 kHz also on an exclusive basis including amateur satellite. The availability of the latter two bands to the Amateur Service is dependent on the completion of the satisfactory transfer of all assignments operating in these bands and recorded in the Master Register. At 7 MHz, the existing amateur band in Region 2 was not changed. The U.S. had to accept, however, a qualifying note whereby the use of the band 7100-7300 kHz in Region 2 shall not impose constraints on the Broadcasting Service intended for use within Regions 1 and 3.

g. The U.S. proposed new exclusive allocations in the 13 MHz and 25 MHz bands for the Radioastronomy Service. A primary allocation to radioastronomy in the band 13,360-13,410 kHz on a shared basis with the Fixed Service was adopted. The band 21,850-21,870 kHz will be vacated by the Radioastronomy Service which has received a new exclusive allocation in the band 25,500-25,670 kHz. The availability of the new band is dependent on the completion of the satisfactory transfer of all assignments to the fixed and mobile stations in the lower part of the band (25,550-26,600 kHz) and of the transfer of the broadcasting stations operating in the upper part to frequencies in accordance with the new plan to be established in the future HF Broadcasting Conference.

h. The existing exclusive allocations for the Aeronautical Mobile (R) Service have been maintained and the recommendation of the 1978 Aeronautical WARC to include the band 21,924-22,000 kHz in the Table exclusively for the Aeronautical Mobile (R) Service was adopted. Implementation of the 1978 Aeronautical WARC Final Acts was not affected. The exclusive provisions of the Aeronautical Mobile (OR) Service were also maintained without change.

i. Discrete Table entries were retained for the Standard Frequency and Time Signal Service at 2.5 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz and 25 MHz. Footnote entries have also been made for the transmission of standard frequency and time signals by stations in Region 3 at 4, 8 and 16 MHz. A new provision for ISM applications was added at 6780 kHz, and the existing provisions at 13,560 kHz and at 27,120 kHz were maintained.

j. A feature of the high frequency part of the Table in comparison with other portions of the Table is the few footnotes giving alternative or additional allocations to individual countries or to groups of countries. In general, those footnotes which have been included for individual countries limit the use of the allocation to services operating within the countries concerned. Other footnotes have been added to allow administrations to use certain bands on a non-interference basis within their territories.

4. Allocations in the Bands 27.5-960 MHz

a. In general, the U.S. proposals in this part of the spectrum were aimed at satisfying the rapidly expanding requirements for shortrange communications in the Aeronautical, Maritime and Land Mobile Services, and the continued satisfaction of broadcasting needs. To accomplish this goal, the U.S. concluded that extensive sharing of frequency bands would be necessary. This approach would have provided administrations with sufficient flexibility to ensure that their future requirements can be adequately accommodated during the time frame of the decisions taken at the 1979 WARC. The Conference increased allocations generally for the Mobile Service worldwide, particularly to satisfy land mobile needs. Sharing of frequency bands was generally accepted where countries were sufficiently separated, with more frequency sharing agreed in Region 3 than in Regions 1 and 2.

b. Between 27.5 and 108 MHz some allocation changes were proposed to enhance provisions for the Radioastronomy Service through a change to the Table or in a footnote. Radioastronomy observations are normally made at a small number of specific locations. Since this service could conduct its research without imposing significant restrictions on the other allocated services, the Conference accepted these changes.

c. A minor change was proposed to the footnote provision for aeronautical marker beacons at 75 MHz. This change required that administrations, in addition to refraining from assigning frequencies that might cause harmful interference to marker beacons, not place any constraint on related aeronautical safety operations. This was agreed. However, the Conference also made a substantial change in the band when it reduced the marker beacon bandwidth from 800 kHz to 400 kHz in Region 2 to align the band worldwide. This will require some improvement in the characteristics of airborne receivers particularly among general aviation aircraft in the U.S. In recognition of this situation, a footnote urges administrations in Regions 2 and 3 to refrain from assigning frequencies to fixed and mobile stations until 1990.

d. The band 108-137 MHz was required for the existing and expanding requirements of aeronautical operations. The U.S. proposed to continue Aeronautical Mobile (R) Service in the band 117.975-136 MHz. It was proposed, however, to modify the footnote provision for use of space communication techniques in the Aeronautical Mobile (R) Service to permit development of satellite systems. There was strong opposition to maintaining this primary footnote on the grounds that VHF aeronautical frequencies are crowded in all parts of the world, that coordination for its use in any Aerosat experiment would place severe constraints on the terrestrial aeronautical operations in the band, and that adequate allocations exist for satellite use at 1600 MHz. The existing footnote was initially deleted at the Working Group level. The U.S. later introduced a footnote for aeronautical mobile satellite use of the band 118-137 MHz on a secondary basis which was adopted by the Conference.

It was also proposed to make a footnote provision for emergency position indicating radiobeacon (EPIRB) systems using satellites on the emergency frequencies 121.5 MHz and 243 MHz. This was agreed with the addition of small guard bands to protect both the satellite EPIRB signals and the operations on adjacent channels.

e. The U.S. proposed to add the Aeronautical Mobile (R) Service in the band 136-137 MHz to meet the future needs of international civil aviation. The proposal would permit Space Research Service operations to continue in the band until January 1, 1990, after which new space research stations would not be authorized. Stations authorized prior to that date could continue to operate but only on a secondary basis to the aeronautical service. Primary Aeronautical Mobile (R), with secondary Fixed and Mobile Services, was agreed for the band 136-137 MHz. Existing space services may continue to operate on a primary basis until January 1, 1990 and on a secondary basis thereafter. The Aeronautical Mobile (R) Service can be introduced only after January 1, 1990 in accordance with internationally agreed plans for that service. Finally, Recommendation ZX was agreed that administrations should take all possible steps to give the required protection to the aeronautical assignments after 1990 and to cease operations of other services as stations of the Aeronautical Mobile (R) Service come into use.

f. There was an important need to provide additional allocations for existing and future shortrange maritime mobile requirements. Therefore, the U.S. proposed a worldwide primary allocation for the Maritime Mobile Service in the band 216-225 MHz. A part of the proposal was to reduce the presently allocated services in the Table to secondary status to permit international maritime planning of the band.

There was sympathy for additional worldwide allocations for the Maritime Mobile Service but agreement to an allocation in this part of the spectrum was not possible because of existing services in Regions 1 and 3. A maritime allocation in the band 216-220 MHz and a mobile allocation at 220-225 MHz was agreed for Region 2. Radiolocation will be reduced to secondary in both bands in Region 2 effective January 1, 1990. The Conference also adopted Recommendation ZY that calls for the next competent WARC to designate suitable bands for a worldwide maritime mobile radiocommunications system. A stronger resolution identifying preferred bands near 900 MHz, e.g., 896-902 MHz and 941-947 MHz, was defeated, principally by African countries which intend to plan the Broadcasting Service (television) in the bands around 900 MHz.

The U.S. also proposed no change to footnote 3595/287 which allows each administration to give priority to the Maritime Mobile Service on only such frequencies as are assigned to stations of that service by the administration. In the U.S. there is considerable use of the footnote 3595/287 frequency bands by certain Land Mobile Services, primarily the railroad industry. There was a strong effort by some maritime countries to modify the footnote to give priority to the Maritime Mobile Service. The language of the footnote was retained essentially without change only after extensive debate on the issue and a very close vote.

g. The band 225-399.9 MHz is heavily used for U.S. Government (primarily military) communications domestically, in Europe and in many other parts of the world, and therefore it was proposed to maintain existing allocations for the Fixed, Mobile and Mobile Satellite Services without change. This objective was met in most of the band; however, the Conference decided to add a primary Table allocation for the Broadcasting Service (television) in Regions 1 and 3 in the band up to 230 MHz. In addition, the fixed and mobile allocations in Region 1 were reduced to secondary status, which is expected to have some impact on U.S. operations in Europe.

The Conference also decided to modify existing footnote 3618/308A which provides for the Mobile Satellite Service in this band. First, the lower segment of the satellite band was changed from 240-328.6 MHz to 235-322 MHz, in order to improve protection to radioastronomy observations in the band 322-328.6 MHz. This band adjustment was acceptable. The footnote was also modified to make the use by the Mobile Satellite Service subject to agreement under the procedures of new Article N13A, which was an appropriate and reasonable requirement, but the Conference then added an additional qualification that such satellite use was "on condition that stations in this service do not cause harmful interference to those of other services operating or planned to be operated in accordance with the Table". The U.S. considered the latter condition to be unacceptable and submitted a reservation for the Final Protocol, jointly with twelve other NATO allies.

h. In the band 420-450 MHz, the U.S. proposed to maintain the exclusive primary Table allocation for the Radiolocation Service for the entire band in Regions 2 and 3 and for the sub-band 430-440 MHz in Region 1. However, the Delegation encountered very strong pressure, mainly from other Region 2 countries and from Region 3, to add primary Table allocations for fixed and mobile and to reduce radiolocation to a secondary basis.

The decisions of the Conference for this band, while far from the desired results, were acceptable in regard to satisfying basic U.S. requirements. The sub-bands 420-430 and 440-450 MHz were modified to provide a worldwide primary Table allocation for the Fixed and Mobile Services and a secondary allocation for the Radiolocation Service. The U.S. and several other countries continued the primary allocation for radiolocation in both sub-bands by adding their names to existing footnote 3640/319. The band 430-440 MHz was continued without change, which includes a worldwide primary allocation for radiolocation.

i. The U.S. proposed that the band 470-890 MHz (with one minor exception) be allocated in Region 2 to the Broadcasting, Mobile and Fixed Services on a primary basis. The intent was to provide sufficient flexibility for administrations to satisfy requirements for these services as they develop in the future. Additional allocations for mobile and fixed had been added to most of the band 890-960 MHz.

The U.S. objective for flexibility in Region 2 in the UHF television band 470-890 MHz was achieved by Table and footnote allocations, as were proposed mobile allocations in portions of the band 890-960 MHz. U.S. footnote allocations had to be taken for portions of the band because of the opposition of many Region 2 administrations to full Table status for the Mobile Service. The U.S. submitted a reservation in the Final Protocol when unnecessary coordination conditions were added to our footnote allocation at the insistence of Canada. Allocations to the Radiolocation Service in the band 890-942 MHz were reduced to secondary status in Region 2 which required us to take a country footnote retaining primary status for radiolocation.

It was proposed to make an exclusive Table allocation for Radioastronomy Service continuum measurements at 608-614 MHz in lieu of footnote 3660/332. The Conference agreed to primary radioastronomy and secondary mobile satellite (except aeronautical mobile satellite) in the Earth-to-space direction. Another U.S. proposal was for a worldwide ISM frequency allocation at 915 MHz plus or minus 13 MHz to provide for industrial heating of medium to large size materials. This was not accepted; however, the existing provisions for Region 2 were maintained.

5. Allocations in the Bands 960 MHz-40 GHz

a. The activities of Working Group 5D in its consideration of the bands 960 MHz-40 GHz involved nearly 4500 specific proposals, significantly more than any other Working Group at the Conference. A number of these were highly contentious, leading to the most difficult negotiations of any WARC issues faced by the U.S. Delegation. Proposals in this part of the spectrum were of several types. First were those intended to accommodate the expanding needs of existing services such as fixed satellite and terrestrial fixed and mobile. Second, there were proposals to provide for new or advanced applications such as GPS radionavigation satellite, active and passive sensing, data relay satellites, and feeder links for broadcasting satellites. Third, there were some proposals for new services and concepts such as the U.S. solar power satellite. Finally, there was a critical need to maintain adequate spectrum for existing services, primarily the Radiolocation Service, in this part of the spectrum. The U.S. proposals were extensive and included each of these four types.

b. The U.S. proposed that the Aeronautical Radionavigation Satellite Service be allocated on a primary co-equal basis with the companion terrestrial service in the band 960-1215 MHz to provide for future unique requirements which may not be satisfied by other systems. The Conference rejected this proposal and maintained the band without change.

c. One of the major objectives of the U.S. at the 1979 WARC was to provide allocations for its newest satellite navigation system, NAVSTAR -- Global Positioning System (GPS). In its present state it consists of six satellites although the ultimate system is to consist of operations involving twenty-four satellites in continuous polar orbit. Originally designed for military applications (ships, aircraft, troops), it may at some point in the future be adapted to civilian use by not supplying some of the sophisticated technology. GPS is far more accurate than any other system in existence.

The U.S. proposed the addition of primary Table allocations for the Radionavigation Satellite Service in the bands 1215-1240 MHz and 1563-1590 MHz. This objective was fully achieved. In the band 1215-1240 MHz the Amateur Service was deleted to protect the GPS system. During the discussions in the Conference the Soviet Union stated a requirement for a similar type of radionavigation satellite system in the band 1240-1260 MHz. The Conference approved an allocation for radionavigation satellite in this band without seriously impacting on other U.S. objectives. New footnote 3673A specifies that the use of the Radionavigation Satellite Service is subject to the condition that no harmful interference is caused to the Radionavigation Service authorized in thirty-six countries of Regions 1 and 3 under footnote 3673.

d. A new footnote for spaceborne radars was proposed in the band 1240-1300 MHz and four other bands higher in the spectrum with the allocation provision limited to secondary status which would provide protection to the terrestrial radiolocation systems. The Conference provided this secondary allocation in footnote 3675A for the use of radiolocation stations on spacecraft in the bands 1215-1300 MHz, 3100-3300 MHz, 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz and 13.4-14.0 GHz.

The U.S. proposed to add the Amateur Satellite Service in the band 1250-1260 MHz and in five other bands up through the spectrum by modification of existing footnote 3644/320A. In each case the amateur satellite was secondary and added to an existing or proposed radiolocation band. The Conference accepted this proposal although the band was shifted to 1260-1270 MHz to accommodate the Soviet radionavigation satellite system. The other three bands are 2400-2450 MHz, 3400-3410 MHz and 5650-5670 MHz.

Although not contained in the U.S. proposals, the Conference adopted a new footnote that allocated the bands 1240-1300 MHz and 1350-1370 MHz to the Aeronautical Radionavigation Service on a primary basis in Canada and the United States.

e. As a general principle, the U.S. proposed to add a primary Table allocation to the Earth Exploration Satellite (passive) and Space Research (passive) Services in the band 1400-1427 MHz and all other higher bands allocated exclusively to the Radioastronomy Service. The U.S. also proposed to add a footnote provision for these services in certain adjacent bands already identified for radioastronomy use. The Conference approved the addition of these two services in all exclusive radioastronomy bands and took specific action to improve the status of the passive bands through the addition of footnote 3679BB which prohibits all emissions. New footnote 3680D provides a secondary allocation to the Space Research (passive) and Earth Exploration Satellite (passive) Services in the bands 1370-1400 MHz, 2640-2655 MHz, 4950-4990 MHz, and 15.20-15.35 GHz.

f. The U.S. proposed to recognize the ongoing search for extraterrestrial intelligence (SETI) by the addition of a footnote in all bands between 1400 and 1727 MHz and in several higher bands. SETI observations are currently being carried out in a number of locations. The Conference adopted footnote 3679A which recognizes the passive research being conducted in the search for intentional emissions of extraterrestrial origins in the bands 1400-1727 MHz, 101-120 GHz and 197-220 GHz. The Conference also adopted Recommendation YU which calls this matter to the attention of a future competent Administrative Radio Conference to consider making further provisions for this application.

g. Specialized mobile operations involving flight telemetry and air frame testing in the United States are conducted in the band 1435-1535 MHz and were proposed in the band 2310-2390 MHz. In view of the critical nature and safety-of-life aspects of the operation, the U.S. proposed to add a new footnote that recognized this application as the primary mobile use in Region 2 in the two bands. The Conference adopted footnote 3680C for Region 2 that establishes a priority for telemetry applications over other uses by the Mobile Services in the former band. New footnote 3680A creates the same priority in the latter band but only in the United States and two other countries. One negative aspect of the allocation decisions in this part of the spectrum is the eventual reduction by 5 MHz of the lower frequency band used for aeronautical mobile telemetry operations to accommodate maritime satellite operations after 1990. However, it is felt that this decision will not place an unduly severe constraint on current and future operations.

h. The band 1535-1660 MHz provided for aeronautical and maritime mobile satellite and aeronautical radionavigation in the Table and for aeronautical mobile (R) and radioastronomy in footnotes. Since the time of allocation of the band at the 1971 Space WARC there were significant changes in the requirements foreseen in the band. These included a substantial increase in bandwidth for maritime satellites, frequency support for the NAVSTAR GPS radionavigation satellite, and a decrease in the number and types of systems planned for operation in the radionavigation band.

The U.S. proposals took into account several objectives. First, it was considered necessary to maintain the existing band edges of 1535-1660 MHz to avoid impact on services in adjacent bands. Second, it was desired to adopt allocations such that there was a common frequency separation between the up and down satellite links for the aeronautical, maritime and distress portions of the band. Third, it was necessary to maintain the existing bandwidth available for the Aeronautical Satellite Service while increasing the maritime satellite allocation. Finally, there was a need to accommodate the GPS system in a fully compatible manner. The Conference decisions to provide for these requirements were fully acceptable although not all of the specific U.S. objectives were achieved. Maritime Mobile Satellite Service was increased to 14 MHz in the downlink direction and 19 MHz in the uplink, which recognized the greater traffic requirement in the ship-shore direction. The lower 5 MHz of the maritime satellite band will become available in 1990. Mobile Satellite Service was maintained at 1 MHz bandwidth in each direction with a new footnote that limits the use of this band to distress and safety pruposes. The Aeronautical Mobile Satellite Service was provided 14 MHz in each direction which required the overall band to be shifted upwards slightly into the existing Radioastronomy Service band. However, this is expected to have a minimal impact on the latter service. Aeronautical Radionavigation and Radionavigation Satellite Services were fully provided for in the center of the band. The resulting overall band edges are 1530 MHz and 1660.5 MHz.

i. The U.S. proposed a number of changes in the band 1700-2300 MHz. The first was a primary worldwide allocation for the Meteorological Satellite Service in the band 1700-1710 MHz with a reduction of the Fixed and Mobile Services to a secondary status. The Conference accepted the primary Table allocation for the meteorological satellite although it did not reduce the Fixed and Mobile Services to secondary status.

Allocations for the Space Operations Service were proposed on a worldwide primary basis in the Table in the bands 1721-1850 MHz and 2200-2290 MHz to provide common standardized equipment in support of all types of satellite systems. To accommodate this requirement, the Conference adopted footnote 3703/356A for Space Operation and Space Research Services in Region 2 and a few other countries in the band 1750-1850 MHz.

Space Research, Space Operations and Earth Exploration Satellite Services were proposed for various parts of the bands 2025-2120 MHz and 2200-2290 MHz to satisfy the requirements for data transfer. The allocations in this part of the spectrum would also be used by the data relay satellite system now under development by NASA that will be used to collect information from a number of low orbiting satellites. The Conference agreed to these proposals on a slightly reduced basis. New footnotes provide for these three services on a worldwide primary basis in the bands 2025-2110 MHz and 2200-2290 MHz; however, space-to-space applications are required to protect other space service operations.

The U.S. proposed to designate two of the existing space research bands for deep space only, since deep space and near space operations cannot share the same band. The Conference adopted footnote 3707B which provides for space research (deep space) on a primary worldwide basis in the band 2110-2120 MHz for Earth-to-space transmissions. The band 2290-2300 MHz was modified to include a worldwide primary Table allocation for space research (deep space) in the downlink direction. The U.S. proposal to limit the primary mobile allocation to other than aeronautical mobile, in order to protect the very sensitive deep space systems from airborne transmissions, was accepted.

j. One of the new concepts considered for this part of the spectrum involved the U.S. proposal for solar power satellite (SPS) systems which may offer the potential for an alternative energy source within the time frame of the decisions of the 1979 WARC. The U.S. proposed that the frequency 2450 MHz be designated for the wireless transmission of energy on the condition that SPS shall not cause harmful interference to stations in other bands. The U.S. proposal was opposed by many countries in both the developed and developing regions of the world. As an alternative, the Conference adopted Recommendation XO calling for CCIR study of the matter but also pointing to the SPM Report which notes 2450 MHz as an appropriate frequency for this use. The Recommendation also invites CCIR to transmit its study to the United Nations.

k. In the view of the U.S. the band 2500-2690 MHz offered unique opportunities for innovative satellite systems in Region 2. The Broadcasting Satellite Service was already allocated in the entire band while Fixed Satellite Service was only allocated in the lower and upper 35 MHz. Because broadcasting satellite is limited to one-way transmission, the U.S. proposed to add fixed satellite (downlink) in the band 2535-2655 MHz to allow flexibility in developing small-terminal interactive systems, possibly operating both fixed satellite and broadcast satellite in a common system. The Conference accepted this proposal and the Fixed Satellite Service (downlink) is now allocated in the Table for Region 2 in the entire band 2500-2690 MHz. Fixed satellite (uplink) is also allocated in the band 2655-2690 MHz.

It was also proposed to relax the power flux density limits for broadcasting satellite by 10 dB and to change the fixed satellite power limit to the same values as broadcast satellite in the band 2500-2655 MHz. This change would allow the use of earth stations using small antennas of about 1 meter diameter. The Conference did not agree to the 10 dB relaxation in the broadcast satellite power limit although it did line up the fixed satellite and broadcast satellite power limits to be the same values. It is interesting to note that Region 3 countries adopted a footnote which added the Mobile Satellite Service to the lower and upper 35 MHz bands in order to achieve even greater flexibility in the development of future systems.

l. The bands 2700-3400 MHz and 9300-9800 MHz are allocated principally to the Radionavigation and/or Radiolocation Services. In general, the U.S. proposed a status quo in these bands with only slight adjustments to accommodate certain radionavigation requirements.

The U.S. proposed provisions for maritime transponders at 3090 MHz and in the band 9500-9520 MHz, and for ground based aeronautical radar beacons in the band 9300-9320 MHz. The latter proposal was accepted by the Conference but the two maritime provisions were rejected. The Conference adopted a footnote specifying that shipborne transponders must be confined to the bands 2930-2950 MHz, 5470-5480 MHz and 9280-9300 MHz. The Conference also adopted Resolution CO relating to the use of these bands and actions which might be taken by a future conference, Recommendation YZ relating to the overall use of these bands for radionavigation purposes, and Recommendation XA relating to the technical standards of shipborne transponders. It is also interesting to note that footnote 3727A provides for maritime shore based radars in the band 2850-2900 MHz in Canada.

m. Fixed Satellite Service below 10 GHz:

1) There was worldwide agreement on the need for additional allocations to the Fixed Satellite Service below 10 GHz. The U.S. and most other countries at the Conference sought additional frequency bands for this service to meet INTELSAT requirements although some other countries also wanted to accommodate domestic and regional systems. Frequencies of this order were strongly preferred over higher parts of the spectrum for both economic and technical reasons. At the same time these frequency bands were already heavily used by existing systems. This requirement gave rise to sharp controversy throughout the entire period of the Conference and consequential negotiations were intense and sustained.

2) The U.S. had identified a sizeable requirement on the order of 700 MHz in the up direction and 400 MHz in the down direction for additional fixed satellite allocations below 10 GHz to satisfy projected needs. This included a requirement for feeder links to broadcasting, maritime and possibly other satellite networks including the uplinks to fixed and broadcast satellites operating in the band 2500-2690 MHz. The U.S. proposed to meet these needs in the band 1850-2200 MHz and part of the existing band

3400-3700 MHz for downlink requirements and in the band 6425-7115 MHz for the uplink. In the United States the new bands would generally be limited to international systems with the exception of satellites operating in the 2500 MHz band.

3) The Conference quickly recognized that it was relatively easy to satisfy the uplink requirement in the 6 GHz band. The real problem was to identify suitable bands for the space-to-Earth direction. The Conference rejected the U.S. proposal at 2 GHz immediately and identified the bands 3400-3700 MHz and 4500-4800 MHz for this purpose. The former band was an existing fixed satellite allocation that had never been implemented except for the MOLNIYA satellite system of the Soviet Union. A special concern of the U.S. was to preserve the primary status and full operational usability of the Radiolocation Service in the band 3400-3600 MHz, now used by important military radar systems. Part of the band 4500-4800 MHz had been allocated to the Fixed Satellite Service but for use in the opposite direction. This band was heavily used by existing fixed (including extensive troposcatter links) and mobile systems, both in the United States and throughout Europe in support of defense requirements. In summary, both bands were unacceptable to the U.S. if any constraints or decrease in the availability of these bands to the heavily implemented existing systems were involved.

The U.S. Delegation took a very strong position on this issue, indicating that it would not accept any decision to downgrade the status of radar systems in the band 3400-3600 MHz. In addition, any discussion of the band 4500-4800 MHz would be linked to successful resolution of the 3 GHz question. During the difficult negotiations that followed, the U.S. implied that it would a) refuse to implement the new fixed satellite frequencies in the U.S.; b) not provide protection to the Fixed Satellite Service from the radars; c) consider using our influence in INTELSAT to block implementation of the frequencies. All of these possibilities were mentioned in an effort to find an acceptable compromise that would at least partially satisfy the needs of the Fixed Satellite Service below 10 GHz.

Led primarily by India, the Conference rejected the U.S. views and Committee 5 adopted changes to the Allocation Table that were unacceptable to the U.S. The Delegation then gave consideration to the development of specific U.S. footnotes that would implement one or more of the possible courses of action which had been pointed out to the other delegations. It was finally decided that the U.S. Delegation should place before the Conference a specific footnote that excluded the Fixed Satellite Service in the United States in both bands. When this was done, the seriousness of our action was recognized by many developing countries and a small group of third world interests, led mainly by Jamaica and Brazil in consultation with INTELSAT representatives, worked continuously to achieve a compromise that would overcome our strong objection. At the eleventh hour of the Conference this group was successful in developing an acceptable compromise and the earlier adverse decision of Committee 5 was overturned at the Plenary level.

4) The resulting decisions of the 1979 WARC regarding Fixed Satellite Service allocations below 10 GHz, although not without many difficulties, were acceptable to the U.S. In the band 3400-3700 MHz the existing allocation for Fixed Satellite Service (downlink) was retained on a worldwide basis. The radiolocation allocation in the Table was reduced to secondary status in all Regions. Footnote 3736A maintains the primary allocation for the Radiolocation Service in Regions 2 and 3, and urges all administrations operating radiolocation systems to cease operations by 1985. The removal of a mandatory requirement to cease radiolocation operations was a key element in the development of an acceptable compromise.

The Conference suppressed the existing allocation for Fixed Satellite Service (uplink) in the band 4400-4700 MHz. A new allocation for fixed satellite (downlink) was added to the band 4500-4800 MHz. New footnote 3748B indicates that the Fixed Satellite Service will not be available in the United Kingdom, Belgium, Norway and the Netherlands. To meet uplink requirements the Conference added fixed satellite to the band 5850-5925 MHz in Region 2 thereby establishing a worldwide allocation in that band. The Conference also added the Fixed Satellite Service (uplink) to the band 6425-7075 MHz providing an overall increase for fixed satellite (uplink) of 725 MHz.

An important part of the eventual compromise was a "declaration" signed by the United States and a number of other developed countries. The declaration is as follows: "The Administrations of the USA, Canada, UK, Netherlands, Australia, Belgium which are member countries of INTELSAT recognizing the importance of the bands 3.4-3.6 GHz and 4.5-4.8 GHz for use by the Fixed Satellite Service (FSS), agree as follows:

i) they shall not by reason of footnotes 3736, 3736A, and 3748B withhold support for the implementation of the FSS in these bands by INTELSAT

either as to the space segment or
as to the use of the band
4.5-4.8 GHz in any other country other than
those listed in footnote 3748B.

ii) they shall make reasonable effort
to accommodate FSS consistent with footnotes
3736, 3736A and 3748B and the normal procedures
of the INTELSAT organization.

The above-mentioned administrations will advise their Signatories to the INTELSAT Agreement accordingly."

The specific conditions for the use of the Fixed Satellite Service by INTELSAT in the United States and in other areas of interest to the U.S. are complex and will require detailed study.

n. Earth Exploration Satellite (passive) and Space Research (passive) Services were proposed to be added to the aeronautical radionavigation band at 4200-4400 MHz which is reserved exclusively for airborne radio altimeters. A proposed footnote provided that no protection will be required from the altimeters. The Conference adopted footnote 3743A to satisfy this requirement.

o. The U.S. proposed that the existing exclusive allocation for radioastronomy in Region 2 in the band 4990-5000 MHz be maintained and that the Space Research (passive) Service be added to the band. This proposal was not accepted by the Conference. Instead, the Conference decided to add the Fixed and Mobile Services to the band in Region 2 thereby establishing a worldwide allocation for fixed and mobile shared with the Radioastronomy Service. Space research (passive) was added to the Allocation Table on a secondary basis.

p. An international standard system for precision approach and landing (MLS-microwave landing system) had been adopted by ICAO in the band 5000-5250 MHz. Therefore, the U.S. proposed that the MLS be given priority in the band by addition of a new footnote. The Conference supported this proposal and adopted a new footnote 3750AA giving priority to MLS. The U.S also proposed to delete several footnotes and transfer their provisions into the Table for the Aeronautical Mobile (R) and Radionavigation Satellite Services. It was intended that the band would be planned by ICAO. However, the Conference rejected this proposal.

q. The bands 5250-5850 MHz were allocated principally to the Radionavigation and/or Radiolocation Services. The U.S. proposed a status quo for these bands. The Conference agreed with this view and made virtually no changes.

r. Various proposals were submitted by the U.S. for passive sensing, space research, and space operations in the vicinity of 7 GHz. The U.S. proposed a footnote that would recognize passive sensing over ocean areas in the band 6425-7125 MHz. Space research (deep space) was proposed for the bands 7145-7235 MHz (uplink) and 8400-8500 MHz (downlink). Space operations in the band 7125-7155 MHz and space research in the band 7125-7145 MHz were proposed. All of these proposals were satisfactorily accommodated by the decisions of the Conference. The U.S. also proposed to add Space Research Service (downlink) in the band 7750-7850 MHz. However, this was not adopted by the Conference.

s. The U.S. proposed to add a primary Table allocation for the Mobile Satellite Service in the bands 7250-7750 MHz and 7900-8400 MHz. The requirement was for government satellite systems in which both fixed and mobile earth stations communicate in the same system. The mobile aspects of the system were not clearly provided for because of decisions taken at the 1971 Space WARC regarding definition amendments that changed the allocation from Communication Satellite Service to Fixed Satellite Service. The U.S. objectives were to gain recognition of the Mobile Satellite Service, retain two exclusive space service sub-bands for the Fixed Satellite and Mobile Satellite Services, and to expand the exclusive bands for these space services.

On balance, the essential U.S. objectives were reasonably satisfied by the Conference. The Mobile Satellite Service was added to the Table by means of a footnote in the bands 7250-7375 MHz and 7900-8025 MHz. However, the exclusive space bands were not maintained since there was strong pressure to add fixed and mobile on a primary basis in this part of the spectrum.

t. The bands 8500 MHz-10.5 GHz were allocated principally to the Radionavigation and/or Radiolocation Services. As in the lower bands, the U.S. proposal was to maintain the status quo for these services. A few minor changes were adopted involving the Aeronautical and Maritime Radionavigation Services. Of more significance was the pressure to add fixed and mobile primary allocations in this part of the spectrum. Many countries joined in a new footnote in the band 8500-8750 MHz which gives primary status for Fixed and Mobile Service. The band 10.0-10.45 GHz in which the Radiolocation Service had a worldwide exclusive primary status was modified to add Fixed and Mobile Services on a primary basis in Regions 1 and 3. The band 10.5-10.55 GHz was modified in the same way for Regions 2 and 3.

u. The maritime community had identified a requirement for future systems involving safety of ship movement such as collision avoidance and ship-to-ship interrogation. The U.S.

proposed to add a primary Table allocation in the band 10.55-10.60 GHz to satisfy these needs on a co-equal basis with the Fixed Service. Priority was given in the lower 20 MHz of the proposed band to meet safety operations in the vicinity of ports and waterways. It was intended that this latter provision would allow international maritime planning of the band. The Conference rejected the proposal although it did adopt Resolution CM calling for further CCIR and national study and inviting the next competent WARC to review possible frequency provisions in the light of additional studies.

v. The U.S. proposed to satisfy critical requirements of the Earth Exploration Satellite (passive) and Space Research (passive) Services in the bands 10.6-10.7 GHz and 18.6-18.8 GHz. Power limits for terrestrial stations in the Fixed and Mobile Services and power flux density limits for the Fixed Satellite Service were proposed in new footnotes to protect the passive services. The Conference accepted the proposal for the former band. However, the new footnote permits a slightly higher power limit for the Fixed and Mobile Services than desired by the U.S. In the latter band, the Conference adopted a primary allocation for Region 2 and secondary allocations for Regions 1 and 3. It also adopted Recommendation YW calling for further CCIR study of the appropriate power limits for this band.

w. To meet firm requirements for the future expansion of INTELSAT, a substantial increase in fixed satellite allocations was required above 10 GHz. The U.S. proposed to allocate an additional 500 MHz in each direction for the Fixed Satellite Service in the bands 10.7-10.95 and 11.2-11.45 GHz (downlink) and 12.75-13.25 GHz (uplink). The Conference adopted this proposal, resulting in a total allocation of 1 GHz for the Fixed Satellite Service in each direction in the bands 10.7-11.7 GHz (downlink) and 12.75-13.25 and 14.0-14.5 GHz (uplink).

x. All administrations sought at the Conference to identify suitable bands to serve as feeder links for the Broadcasting Satellite Service. In general, the U.S. position was that feeder links for the various radio services including broadcasting satellite, should be satisfied in the most appropriate fixed satellite band. As an exception, the U.S. proposal to separate fixed satellite and broadcasting satellite allocations at 12 GHz in Region 2 created a need for an additional 500 MHz allocation for fixed satellite for use limited to broadcasting satellite feeder links. Therefore, it was proposed that fixed satellite (uplink) be added to the band 17.1-17.6 GHz primarily for use in conjunction with the Broadcasting Satellite Service in the 12 GHz band.

As with other fixed satellite issues, this subject was extremely controversial. Developing countries led by India made a strong effort to place the feeder links in the band 14.5-15.35 GHz to be shared on a primary basis with the terrestrial Fixed and Mobile Services. The U.S. took an equally strong objection to the proposed sharing in this band, particularly in the upper portion, because of worldwide use of the present allocations for defense and other purposes. The U.S. was joined in its opposition by a number of allies and also by the USSR which has other uses for this band that are technically incompatible with feeder links. After a prolonged and frequently bitter controversy, a compromise was adopted which provided for the use of several bands for broadcasting satellite feeder links at the option of individual administrations. In each case, the band is allocated to the Fixed Satellite Service (uplink) and is limited to feeder links for the Broadcasting Satellite Service. The band 10.7-11.7 GHz is available for this purpose in Region 1. The bands 14.0-14.5 GHz and 14.5-14.8 GHz are available for countries outside Europe, with the former band subject to coordination with other networks in the Fixed Satellite Service. The third band, 17.3-18.1 GHz, is available on a worldwide basis for this purpose.

The use of the new bands for broadcasting satellite feeder links will be in accordance with agreements and associated plans to be adopted at a future radio conference. Resolution BQ invites the Administrative Council to study the question of convening such a conference for Regions 1 and 3. In the interim, administrations of Regions 1 and 3 are to apply the procedures prescribed in Articles N11/9A and N13/9A and in new Resolution CS for any use of the feeder links to broadcasting satellites. New Resolution CH, relating to the Region 2 Broadcasting Satellite Conference scheduled for 1983, calls for the Region to plan feeder links in an appropriate part of the band 17.3-18.1 GHz.

y. - An important issue for the United States and other Region 2 countries involved the band 11.7-12.7 GHz. The 1971 Space WARC had allocated the band 11.7-12.2 GHz in Region 2 to both the Broadcasting Satellite and Fixed Satellite Services to meet anticipated requirements. At the 1977 Broadcasting Satellite WARC, Region 2 decided to defer planning and adopted an interim arc segmentation scheme that designated separate parts of the geostationary orbit to broadcasting and fixed satellites until such time that a regional planning conference was held. After considerable study of the problem, the U.S. concluded that the arc segmentation scheme would not meet Region 2 requirements of either the Broadcasting Satellite or Fixed Satellite Services in this part of the spectrum. It was further concluded that the ideal solution would be to provide separate allocations for each service. Therefore, it was proposed to move the allocation for

Broadcasting Satellite Service upward to the band 12.2-12.7 GHz and to maintain the Fixed Satellite Service allocation in the existing band 11.7-12.2 GHz. The decision to move broadcasting satellite was based on the extensive development of fixed satellite systems in the lower band. Additionally, the Broadcasting Satellite Service would be easier to share with existing and future terrestrial services in the band 12.2-12.7 GHz than the planned fixed satellite systems.

During the Conference many Region 2 countries expressed a strong wish to defer the allocation question until the 1983 regional conference. They generally agreed to expand the allocation for the two satellite services to a total of 1 GHz in recognition of the need for additional spectrum, but desired to postpone the final decision on the amount of the allocation to each service until they had a better idea of their requirements for the space services. The U.S. persisted in the negotiations in view of the advanced planning for domestic fixed satellite systems in the band 11.7-12.2 GHz. The resulting Conference decisions met nearly all the specific U.S. objectives and were fully acceptable.

The Conference adopted allocations in Region 2 for the Fixed Satellite Service in the band 11.7-12.3 GHz and for the Broadcasting Satellite Service in the band 12.1-12.7 GHz, along with compatible terrestrial services. The center band, 12.1-12.3 GHz, was allocated on a co-equal, primary basis to both services until a final decision is taken by the 1983 regional conference. Both satellite services are limited in Region 2 to national and sub-regional systems. In the lower band, transponders on fixed satellites may also be used for broadcasting satellite transmissions provided the maximum radiated power does not exceed 53 dBW per television channel. The upper band may also be used for the Fixed Satellite Service provided that such transmissions do not cause more interference or require more protection from interference than the Broadcasting Satellite Service operating in accordance with a plan. The Conference also adopted Resolution CH calling for a regional radio conference not later than 1983 to carry out detailed planning of the Broadcasting Satellite Service in the upper band. Resolutions CI, CJ and CK also relate to the upcoming 1983 Broadcasting Satellite Conference for Region 2.

Another item of interest in this band was an Australian proposal to add Broadcasting Satellite and Fixed Satellite Services in Region 3 to provide for possible future implementation of hybrid satellite systems. After much discussion, it was agreed to add allocations in the Table for the Fixed Satellite and Broadcasting Satellite Services in the band 12.5-12.75 GHz for Region 3. Resolution CL refers to the establishment of new services under this allocation.

z. In the band 13.4-14.0 GHz, the U.S. proposed that the primary allocation for the Radiolocation Service be maintained, that a new allocation be added for Standard Frequency and Time Signal Satellite Service (uplink) and that a secondary Table allocation be added for the Space Research Service. The Conference agreed to these proposals; however, a large number of countries are now included in a new footnote that also allocates this band to the Fixed and Mobile Services on a primary basis. In view of the addition of this footnote, the U.S. included the band 13.4-14 GHz among others between 430 MHz and 36 GHz in its reservation stating that it could not provide protection to these services from the radiolocation operations.

aa. The U.S. proposed to maintain the Radiolocation Service as a primary Table allocation in the band 15.7-17.7 GHz. It was also proposed to add a primary Table allocation for the Space Research Service (uplink) to meet deep space requirements in the bands 16.6-17.1 GHz. The Conference agreed to continue radiolocation as a primary Table allocation in most of the band; however, above 17.3 GHz, the allocation was downgraded to secondary status. Space research (deep space) was added to the Table in the proposed band but only on a secondary basis. Earth exploration satellite (active) and space research (active) were added as secondary Table allocations in the band 17.2-17.3 GHz to meet requirements that the U.S. had proposed to be satisfied in other bands.

bb. The existing Table provided allocations to the Fixed Satellite Service in the bands 17.7-21.2 GHz (downlink) and 27.5-31.0 GHz (uplink) in which the upper 1 GHz of each band is designated for U.S. Government space systems nationally. The Conference agreed to the U.S. proposal that these bands should be maintained. In addition, the U.S. had proposed to add the Mobile Satellite Service on a primary basis to the bands 20.2-21.2 and 30.0-31.0 GHz since requirements exist for the development of Government satellite systems that include both fixed and mobile earth stations on land, air and sea platforms similar to existing systems at 7/8 GHz. The Conference accepted this proposal although many countries are now included in new footnotes that give primary allocation status to the Fixed and Mobile Services. The Conference also adopted secondary Table allocations for mobile satellite in the bands 19.7-20.2 and 29.5-30.0 GHz.

The U.S. also proposed a primary Table allocation for the Meteorological Satellite Service (downlink) in the band 17.7-17.9 GHz. This requirement was satisfied by the addition of footnote 3799A which provides for meteorological satellite on a primary basis in the band 18.1-18.3 GHz.

cc. The existing Allocation Table provided an allocation to the Broadcasting Satellite Service in the band 22.5-23 GHz for Region 3 only. The U.S. proposed that this allocation be extended worldwide on a primary Table allocation basis. The Conference adopted this proposal for Regions 2 and 3 only.

dd. Existing allocations to the Intersatellite Service in the vicinity of 60 GHz cannot be used in the near future for technical and economic reasons. Therefore, it was considered necessary to provide allocations lower in the spectrum to satisfy near-term requirements for direct links between satellites. The U.S. proposed to add the Intersatellite Service allocation in the bands 22.6-23.6 GHz and 25.25-26.25 GHz on a shared, co-equal basis with existing services. The Conference accepted the former proposal adjusted slightly downward to the band 22.55-23.55 GHz, but was unable to accommodate the Intersatellite Service in the upper band. Instead, an allocation for the Intersatellite Service was approved in the band 32-33 GHz. Recommendation WV was adopted which calls attention to the sharing problems between the Intersatellite Service and the Radionavigation Service in this band.

ee. To provide for the transfer of data between satellites, the U.S. had proposed the addition of a primary Table allocation for the earth exploration satellite (space-to-space) in the band 25.25-27.5 GHz. The Conference adopted a secondary Table allocation to satisfy this requirement.

6. Allocations in the Bands Above 40 GHz

a. The U.S. proposed that specific allocations be made for both space and terrestrial services in the bands from 40 GHz to 300 GHz. Specific allocations were necessary for several reasons. First, many spectral lines had been identified which are important to the passive radio services -- radioastronomy, space research and earth exploration satellite. The unique physical properties of the lines dictate the allocations for these services. Second, development of equipment for frequencies above 40 GHz was currently in progress. Specific allocations would provide guidance for the orderly development of new technology and the next generation of telecommunications systems. Finally, it was not certain when the next radio conference, competent to deal with the spectrum above 40 GHz, would be convened. In view of the rapid development of the recent past, it was felt necessary to prepare for the future by providing sufficient allocated bands in a flexible arrangement to accommodate the foreseen requirements.

b. The Conference adopted several principles to guide the decisions taken in this part of the spectrum. First, it fully recognized that due account had to be taken of the effects on allocations of the absorption bands related to the atmospheric constituents -- oxygen and water vapor. While these would result in restrictions on the use of spectrum for certain types of service in the bands concerned, they could also be exploited to advantage in other cases. Second, a middle-of-the-road approach was taken between the two extremes for allocating the bands: an exclusive or very limited sharing basis versus allocation of a band to many services that could be shown to be compatible in principle. Finally, it was recognized that the time frames within which the various services would exploit the spectrum above 40 GHz would vary over a wide range. There is already significant activity in areas such as radioastronomy, while it might be some time before operational broadcasting and radionavigation systems evolved. There was broad agreement that specific allocations were required to act as stimulus and guidance for research and development.

c. In general, all U.S. objectives were met in the bands above 40 GHz, although the Conference decided to adopt specific allocations only up to 275 GHz rather than the 300 GHz limit we proposed. The Allocation Table was actually extended to 400 GHz, with a Table entry in the band 275-400 GHz stating "not allocated" and a footnote authorizing experimental and developmental use for the various active and passive services. The footnote also lists several bands of interest to the Radioastronomy, Space Research (passive) and Earth Exploration Satellite (passive) Services, with texts urging administrations to protect these passive services until the next competent WARC takes further decisions. It is interesting to note that there is not a single exclusive allocation above 40 GHz.

d. In general, the U.S. proposed to add the companion terrestrial service to the already existing space service allocations in most bands noting that allocations above 40 GHz were confined previously to the space services and to radioastronomy. The group of allocations to the Aeronautical and Maritime Mobile/Radionavigation Satellite Services were generalized in this manner by the addition of corresponding terrestrial services.

It was also proposed to allocate a number of bands to the Fixed and Mobile Satellite Services. A new allocation was proposed for the Intersatellite Service and terrestrial Fixed and Mobile Services were added to all Intersatellite Service bands in the high absorption areas of the spectrum. The pattern of allocations to the Intersatellite and the Fixed

Satellite Services follows generally that laid down by the 1971 WARC, i.e., with the former concentrated in the absorption bands to provide shielding between the space and the surface (or low altitude) systems, and the latter located in spectrum between the absorption bands. Allocations were made to a variety of terrestrial services, although in the case of certain combinations of space and terrestrial services, it was concluded that there was inadequate information on sharing. Footnotes were therefore added to reflect this uncertainty and the subjects were referred to the CCIR for further study.

The need for spectrum for feeder links to broadcasting satellites was taken into account in allocations to the Fixed Satellite Service. In the 40 GHz region a band was identified by a footnote although not reserved exclusively and the potential need for the broadcasting satellite application has been emphasized. In the same way, additional spectrum was allocated to the Fixed Satellite Service (Earth-to-space) near 100 GHz keeping in mind the allocation to Broadcasting Satellite Service in the band 84-86 GHz.

e. Radioastronomy and the other passive services have unique requirements in this part of the spectrum. Exclusive allocations in the Table were proposed for radioastronomy in each of the atmospheric "windows" and at several other frequencies for continuum emission observations. In general, all three passive services were proposed for these bands. Allocations of additional spectrum were made to the Radioastronomy Service, recognizing in each case the nature of the observations, i.e., of spectral lines or of the continuum. Significant increases have been made to the spectrum allocated to the Earth Exploration Satellite and the Space Research Services for the operation of passive sensors. In addition, provision was made for the operation of radars on board spacecraft in the latter two services.

f. Primary allocations were proposed for the Radiolocation Service in each of the "windows" in order to offset to some extent the very high attenuation suffered in the two-way signal path required by radar. Radiolocation allocations were made in two distinct groups -- in the absorption bands for shortrange systems with a high potential for frequency re-use, and in the radio windows between those bands for longrange systems.

g. Small exclusive allocations were proposed for the Amateur and Amateur Satellite Services to permit a wide range of experimentation without restrictions or interference from other radio services. The Amateur Service was also proposed on a secondary basis in several bands allocated to the Radiolocation Service. Extensive allocations were adopted for the Amateur and Amateur Satellite Services, both on an exclusive basis and on a shared basis with other services and with a secondary status. In the latter case, the allocations are contiguous with the former.

h. Three new bands were designated for ISM applications. Two significant factors in the allocations are that the bands are in harmonic relationship and that the use of the bands is subject to special authorization by the administration concerned in agreement with other administrations whose radiocommunications services might be affected.

7. Other Provisions Relating to Frequency Allocations

a. In addition to the Table of Frequency Allocations, Committee 5 was responsible for consideration of all other provisions in the Regulations relating to the use of frequency allocations. This included definitions (other than technical terms), general and specific rules for the assignment and use of frequencies, and certain provisions relating to a single service which had been included in the agenda for the Conference. Discussion of these items is contained in the following paragraphs.

b. It was the U.S. position that the terms and definitions of Article N1/1 were generally adequate. Due to the profound effect that terms and definitions have on the interpretation of the Radio Regulations, it was considered important that changes to this Article be kept to an absolute minimum. The U.S. proposed that a few terms and definitions be slightly modified. In addition, new definitions were proposed to be added for maritime radar beacon (RACON), transponder and maritime transponder. The purpose of these new definitions was to distinguish clearly between these types of operational uses.

The Conference spent a considerable amount of time and discussion on the subject of definitions. The overall structure of the Article was amended by both Committee 8 in relation to the rearrangement of the Radio Regulations and by the several committees including Committee 5 which reviewed various sections of the Article. In the end there were substantial additions to and modifications of the existing terms and definitions. Under the category of general terms, new definitions were added for administration (identical to that now included in the Convention), coordinated universal time (UTC), and industrial, scientific and medical (ISM) applications. A new section was added to the Article providing definitions for allocation, allotment, and assignment. In the section entitled Radio Services, new terms were added for radiocommunication service, mobile earth station, coast earth station, aeronautical earth station, aircraft earth station, feeder link. The existing separate services of standard frequency and time signals were combined into a single service. New operational terms were established for public correspondence and telecommand. Finally, new terms were established to define active sensor and passive sensor. In addition to the creation of these new terms, Committee 5 modified about thirty of the existing definitions.

Although not consistent with the initial U.S. views for the handling of terms and definitions, the Delegation found the many additions and modifications to be acceptable. The U.S.-proposed modifications were nearly all adopted. However, the three new definitions proposed were not accepted by the Conference.

c. The next major category of work in this area involved the general and special rules for the assignment and use of frequencies as contained in Articles N5/3, N6/4, the initial sections of Article N7/5, and Article N8/6. The U.S. proposed very few changes for these Regulations since the existing provisions were generally adequate and necessary.

In Article N5/3, General Rules for the Assignment and Use of Frequencies, the Conference added a number of provisions. First was a general regulation encouraging Members to limit the number of frequencies and spectrum space used to the minimum essential to provide satisfactory service. This new provision is a duplication of the existing provision No. 130 of the Convention. A provision was added for the new passive services of space research and earth exploration satellite which provides that they shall be afforded protection from other services only to the extent that these different services are protected from each other. This new provision parallels the existing one for radioastronomy. Finally, two new provisions were added to Article N5/3 to provide on an exceptional basis for a station in distress or involved in disaster situations to use any means of radiocommunication at its disposal to attract attention and obtain assistance. There were no substantial changes or additions to Article N6/4, Special Agreements.

The Conference adopted two changes to Article N7/5 to assist in the use and understanding of the Table of Frequency Allocations. The first involved the addition of a new provision at the beginning of the Article which provides a comparative table for the terms allocation, allotment and assignment in the three working languages of the Union. This table was previously contained in Resolution No. 6 of the 1959 Radio Conference. The second change to the Article was the incorporation of the Chart of Regions as Defined in Table of Frequency Allocations, which was previously given in Appendix 24 of the Regulations. No changes were made to the definitions of the three ITU Regions or to the Chart, although this was a matter of considerable discussion in the initial stages of the Conference. Developing countries in general and certain African countries of Region 1 in particular, expressed concern that the existing division of the world into three Regions may not be appropriate to meet the requirements of all countries on an equitable basis. Since it was not possible to reach a decision on this matter during the Conference, Resolution AB was adopted which resolves that the existing geographical division of the world should be reviewed in the light of major developments in radio technology and the increase in membership of the Union with countries at different stages of development. CCIR was requested to undertake a study of the technical and operational bases for a possible revision of the world's Regions for the purposes of allocating frequency bands. The results of the CCIR study are to be available not later than the XVIth Plenary Assembly so that the Plenipotentiary Conference can take action to suitably resolve the issue at one of the future radio conferences.

New terms were also added to the Article for the African broadcasting area and to define a sub-region which is an area consisting of two or more countries in the same Region.

The only significant change to Article N8/6, Special Rules for the Assignment and Use of Frequencies, was the addition of a new provision stating that Members recognize that the safety aspects of radionavigation and other safety services require special measures to ensure freedom from harmful interference.

d. During the general discussion in Committee 5 of the Table of Frequency Allocations and the related provisions, there was some concern expressed about the various country and/or geographical names used in the footnotes of the Allocation Table. The concern related to the implications that might be drawn in the use by the International Telecommunication Union of certain names that were involved in sovereignty or territorial claims. It was the view of Committee 5 that a disclaimer should be placed at the beginning of the Table of Frequency Allocations. In the end, the Conference decided that the disclaimer should be placed at the very beginning of the Radio Regulations in a preamble. The complete text of the preamble is as follows: "The application of the provisions of these regulations by the permanent organs of the International Telecommunication Union does not imply the expression of any opinion whatsoever on the part of the Union concerning the sovereignty or the legal status of any country, territory or geographical area."

e. In an effort to simplify and clarify the Table of Frequency Allocations and the many associated footnotes, Committee 5 spent considerable time developing a set of standardized footnotes that would be used throughout the Table. Uniform footnotes were adopted for alternative allocation, additional allocation, and different category of service, and each footnote of these types is so indicated. Standardized text was also adopted for footnotes dealing with general allocations and footnotes involving the Radioastronomy Service.

f. To improve the utilization of the high frequency band, the U.S. proposed a number of changes to Section 1 of Article N28/7 for the Broadcasting Service. In general, it was recognized that the requirements of shortwave broadcasting could not be met entirely by an increase of frequency allocations, although the U.S. did propose substantial increase in the high frequency bands for this service. The proposed changes would limit the power of transmitters to 50 kilowatts in the case of domestic broadcasting in the HF band with an upper limit of 250 kilowatts for all broadcasting transmitters. Double sideband transmissions were to be discontinued by a specific date to be decided by the 1979 WARC (the U.S. suggested a date of January 1, 1995). A new provision would allow the use of only one frequency per frequency band to broadcast simultaneiously the same program to any single or contiguous zone. This group of proposed changes to improve the technical standards of the HF Broadcasting Service formed a very important part of the United States objectives with respect to this service.

The subject of high frequency allocations was one of the most difficult issues at the Conference, as indicated elsewhere in this report. The Conference did not allocate sufficient new bands for the Broadcasting Service. To further compound the problem of severe congestion in the shortwave broadcasting bands, the Conference decided to defer consideration of technical regulations and improvements until the first session of the scheduled HF Broadcast Planning Conference. The only change adopted for the Broadcasting Service was the addition of a new provision in Article N28/7 that limits the carrier power of broadcasting transmitters in the domestic service to 50 kilowatts which was, in fact, one of the U.S. proposals. In effect, the majority of the U.S. proposals were tabled until the first session of the broadcasting conference called for in new Resolution DI. The Conference also adopted new Recommendation H relating to the preparation of the technical information necessary for the upcoming conference and Recommendation I relating to studies for the introduction of single sideband techniques in the HF Broadcasting Service.

g. The U.S. proposed only a minor editorial change to Article N29 relating to the Fixed Service. The Conference accepted this change and made no others to the Article.

h. Committee 5 also reviewed Article N47, Special Rules relating to the Use of Frequencies in the Aeronautical Mobile Service. The Conference adopted only minor editorial changes to this Article.

i. After much discussion the Conference decided to establish new Article 33A relating to the Radioastronomy Service. The Article contains general provisions, measures to be taken by the Radioastronomy Service and provisions regarding protection to the Radioastronomy Service. The Delegation supported the creation of this new Article since it was considered very useful to collect all of the provisions relating to the Radioastronomy Service in a single place.

F. Work of Committee 6 - Regulatory Procedures Committee

1. The U.S. objectives in Committee 6 were as follows:

a. Provisions relating to the International Frequency Registration Board (IFRB)

The functions of the IFRB are described in Article N9 while provisions relating to the Board's internal organization and operations are contained in Article N10. The provisions of these Articles were generally considered to be adequate and thus only a minor clarification was proposed to Article N9 relating to preparations for Radio Conferences.

b. General Remarks on Coordination and Notification Procedures

The provisions of Articles N11, N12 and N13 relating to the coordination and notification of stations in the space and terrestrial services were essentially adequate as contained in the Radio Regulations. The U.S. believed the existing procedures had served well in accommodating new technology and systems. U.S. proposals for changes to the procedures were aimed primarily at clarifying the intent of the existing provisions.

c. Notification of Terrestrial Stations

Article N12 relates to the notification of frequency assignments to terrestrial stations. The essential features of Article N12 had been in existence since 1959 and were generally adequate. Therefore, minimum changes were proposed in order to clarify the intent of certain regulatory provisions.

Modifications to Article N12 had the following objectives:

1) To take into account the Final Acts of the 1978 World Administrative Radio Conference for the Aeronautical Mobile (R) Service;

2) To suppress certain regulatory provisions consequential to the completion of the steps set forth in Resolution Mar2-12; and

3) To clarify the circumstances under which an earth station that has been recorded with a favorable finding in the Master International Frequency Register will be taken into account by the IFRB during its technical examination relating to harmful interference.

Modifications to Appendix 1 were proposed to improve the accuracy of information in the Master Register and the International Frequency List concerning actual usage of frequency assignments. Such information was particularly desirable with respect to assignments below 27.5 MHz. To accomplish this, the U.S. proposed that Column 10 relating to maximum hours of circuit operation be phased out and Column 11 be revised and used to indicate, as a basic characteristic, the regular hours of operation of the frequency assignment being notified. Consequential changes were necessary to Appendices 1A and 9. A new Appendix 10A was proposed to provide appropriate symbols for use in Column 11.

d. Coordination and Notification of Space Service Stations

Existing procedures provided a three-step process for bringing into use space radiocommunication services. The process of advance publication, coordination, and notification of frequency assignments had proven to be a flexible as well as an effective mechanism for introducing new space networks.

In addition to clarification and simplification, some of the U.S. proposals in this section had the objective of minimizing the burden of coordination, such as when adding new earth stations to an existing network.

Modifications to Articles N11 and N13, dealing with the coordination of space service stations, had the following objectives:

1) To clarify that comments provided by administrations to the IFRB during the advance publication process concerning possible unacceptable interference shall be confined to existing or planned space radiocommunication services;

2) To preclude any possible requirement to coordinate a new space station or earth station assignment with an administration having an assignment for a geostationary satellite system which is not in accord with the Convention, the Table of Frequency Allocations or other provisions of the Radio Regulations;

3) To facilitate satellite inter-system coordination by requiring administrations to provide information in Appendix 1A for typical earth stations in certain situations;

4) To clarify that coordination agreements are based on interference levels and not on increases in noise temperature;

5) To eliminate any requirement to coordinate the addition of new earth stations to an existing satellite network where the potential interference from such stations does not exceed limits agreed to during the initial coordination of the network;

6) To recognize proposed procedures relating to the coordination of mobile earth stations;

7) To clarify that existing space or terrestrial station agreements which have been recorded with a favorable finding in the Master International Frequency Register will be taken into account by the IFRB during its technical examination relating to harmful interference;

8) To provide for an extension of time with respect to the bringing into use of a satellite network due to delays or circumstances beyond the control of the notifying administration; and

9) To provide for periodic review of space radiocommunication entries in the Master International Frequency Register in order to improve the accuracy of the Register.

e. Monitoring, Infringement and Harmful Interference Procedures

Article N18 concerned the international monitoring of radio frequencies. To improve the quality of international monitoring, a modification was proposed to delete the provision whereby stations are permitted to observe lower technical standards than those recommended by the CCIR. Appendix 6 to the Radio Regulations concerned reports of monitoring data and was adequate as it existed.

One change was proposed to Article N19, Reports of Infringements. This would permit an administration, where it has information of an infringement of the Convention or Radio Regulations, to take action against any station, authorized or unauthorized, over which it has authority. Appendix 7 to the Radio Regulations concerned infringement reports and was adequate as stated.

Several changes were proposed to Article N20, Procedure in a Case of Harmful Interference, that were intended to facilitate the resolution of harmful interference cases. Appendix 8, Report of Harmful Interference, was adequate as it existed.

f. Reaccommodation Procedures

The United States proposed a reallocation of certain existing high frequency Fixed Service bands to meet urgent requirements of other radio services. Reallocation of the Fixed Service bands was considered to reflect a decreased need, particularly for international circuits. However, a substantial number of Fixed Service frequency assignments shown in the International Frequency List in bands proposed for reallocation represented valid operational requirements.

Therefore, the U.S. proposed that the 1979 WARC adopt procedures that would ensure reaccommodation of HF fixed assignments in the reallocated bands in an orderly manner, following these principles:

1) Administrations should critically review their assignments in the HF bands allocated to the Fixed Service contained in the Master Register and remove those that no longer represent continuing operations;

2) Responsibility for reaccommodating continuing fixed assignments not compatible with new allocations made by the Conference shall primarily be that of the administration concerned; however, technical assistance will be provided by the International Frequency Registration Board;

3) The transition period over which the reaccommodation will occur should be a reasonable period of approximately 4 to 6 years; and

4) At the end of the transition period during which reaccommodation of Fixed Service frequency assignments are made, all fixed assignments then contained in the Master Register shall receive the same common date. Thereafter, the provisions of Article N12 shall be followed.

g. New Resolutions

A new Resolution No. AA relating to the Amateur Satellite Service was proposed to take into account the uniqueness of this service. Strict compliance with Article 9A did not appear to be feasible due to the fact that earth stations in the Amateur Satellite Service were not assigned specific frequencies and because of the widely varying equipment characteristics that result from the experimental nature of the service.

To recognize the difficulty involved in the advance publication, coordination and notification of information for the Amateur Satellite Service, proposed Resolution No. AA permitted administrations to supply as much information as possible in compliance with Nos. 4100, 4117, etc. Such information supplied for Appendices 1A and 1B would be considered complete and will be published in a special section of the IFRB Weekly Circular.

New Resolution No. BB related to notification of frequency assignments and stipulated that, unless special arrangements were made, frequency assignments for a station should be notified by the administration on whose territory the station is located. This Resolution basically updated existing Resolution No. 5.

New Resolution No. CC relating to notifying frequency assignments under Appendix 1 was also proposed. This Resolution was consequential to changes described above concerning frequency assignment usage and modifications to Columns 10 and 11 of Appendix 1. The Resolution provided interim procedures to assist the IFRB in implementing the proposed changes.

2. The results in Committee 6 were as follows:

a. Provisions Relating to the IFRB

Articles N9 and N10 dealing with the functions of the IFRB were combined into one article with no increase in the authority of the IFRB. The People's Republic of China proposed that the IFRB prepare draft Technical Standards and Rules of Procedure which would be placed on the agenda of a competent World Administrative Radio Conference for consideration and approval. Consideration of this proposal resulted in Resolution AA that:

- requires the distribution of the Technical Standards and Rules of Procedure to all Members of the Union for comment;

- refers the matter to the CCIR in the event of an unresolved disagreement over any Technical Standards;

- refers the matter to a World Administrative Radio Conference in the event of an unresolved disagreement over the substantive contents of the Rules of Procedure; and,

- requires the IFRB to take consequential action, including a review of all relevant findings, after the resolution of the matter.

b. Notification of Terrestrial Stations

1) Extensive discussion was devoted to the adequacy of existing regulatory procedures relating to the registration of frequencies for terrestrial stations as provided for in Article N12. In general, the existing procedures were criticized by developing countries as being based on the principle of first-come, first-served and contrary to their interests, particularly to those administrations that have emerged from colonial status to independence since the last general revision of the Radio Regulations in 1959. This criticism was mainly in terms of their difficulties in obtaining frequencies in the HF band for domestic communications - which is the only practical means of long-distance communications for some countries. The developing countries also tended to criticize the existing regulations as overly complex and, for administrations which have an inadequate frequency management infrastructure, beyond their capability to administer. Thus they argued that even though administrations, strictly speaking, might have equal rights under the regulations, they, in fact, did not enjoy equal rights in practice.

The developed countries essentially contended that the existing procedures were designed to protect registered assignments against harmful interference. It was pointed out that whatever first-come, first-served aspects might exist with respect to Article N12, experience had shown that administrations were not denied access to the spectrum in the HF fixed bands and that real requirements were continuing to be satisfied. The HF fixed spectrum was not in fact saturated although one might conclude otherwise based upon the number of frequency assignments listed in the Master International Frequency Register (MIFR). This problem resulted from the fact that the MIFR contained a number of unused assignments, or "deadwood", together with a number of assignments which were being utilized in a manner inconsistent with their notified characteristics. Both the U.S. and the United Kingdom submitted proposals prior to the Conference to remedy the problems associated with the MIFR.

2) Discussion on possible changes to Article N12 focused on a formal proposal by Algeria to radically alter existing procedures by allocating frequencies in the HF Fixed Service bands on a 70-30 basis in favor of developing countries. The Algerian proposal was not acceptable as a matter of principle to the developed countries and, indeed, to a number of developing countries as well which make extensive use of the radio spectrum. Proponents of the Algerian proposal stressed that their objectives were to secure assured access to the spectrum and, once having access, to be able to operate their stations free from harmful interference. While all countries could support these general objectives, it was apparent that the Algerian proposal did not deal with the asserted shortcomings of the existing procedures but was simply an arbitrary division of spectrum resources with no assurance that the real needs of an administration would be met. It was evident from the outset that some accommodation would be required to meet the perceived needs of the developing countries but on terms acceptable to all administrations attending the Conference, if the workings of the ITU were not to be seriously undermined. This was ultimately accomplished through a succession of informal and then formal contacts and discussions which produced a set of guidelines as the basis for developing specific regulatory provisions in Article N12. An acceptable compromise was worked out based both on proposals submitted prior to the Conference, and proposals which surfaced during the Conference. The U.S. was an active participant and contributor to this process.

The essential elements of the eventual compromise were: (a) removal of unused HF assignments in the Master Frequency Register; (b) reclassification of remaining assignments according to needs and alternative means; (c) identification of new frequencies for HF fixed assignments displaced by allocation changes ("reaccommodation"); (d) increased assistance by the IFRB to countries needing help in finding new frequencies, and in identifying interference; (e) revision of Article N12, and related texts, to implement these procedures. The "package" also included new Resolution BZ to the effect that certain provisions introduced into the Radio Regulations are intended essentially for use by the administrations of developing countries, and that therefore administrations of developed countries should minimize their use of these provisions.

3) The provisions which require the IFRB to select a frequency for an HF station in the Fixed Service for a country also call for existing entries to be modified if that will permit the accommodation of a new assignment. In order to

assist the IFRB and administrations in selecting assignments for stations in the Fixed Service in the HF bands, the assignments will be required to be classified as to their operational status and more precise information furnished on hours of operation.

4) Another modification was to revise the "insistence procedure" whereby an assignment which receives an unfavorable finding due to the probability of interference to an existing assignment is resubmitted to the IFRB stating that no reports of harmful interference have been made. The new provisions call for the IFRB to publish the resubmitted assignment and to notify the administrations that may be affected. The administrations are then to report to the IFRB if interference is caused to their assignments during a two-month period. IFRB action at the end of the period will be determined by the reports, if any, that are received.

5) To maintain the accuracy of the Master Register, provisions were adopted whereby the IFRB is to conduct periodic review of each section by sending to each administration extracts of their entries for review and necessary revision.

6) A special procedure dealing with the removal of unused assignments from the Master Register, classification of assignments, and the reaccommodation of displaced assignments was adopted for the HF bands presently allocated to the Fixed Service. By March 31, 1981 administrations must delete assignments no longer used, classify the remaining assignments according to the degree of interference protection required and indicate the regular hours of operation of the frequency assignment. After the administrations have responded, the IFRB shall prepare and on October 1, 1981 shall publish a provisional section of the Master Register containing the assignments subject to the clean-up procedure. These assignments shall contain a common date in column 2 and the IFRB findings shall be amended with the prescription given in Resolution CT. Additionally, those assignments which are in bands that have been reallocated from the Fixed Service will be annotated to reflect that they must be reaccommodated in bands that remain allocated to the Fixed Service.

7) Under the reaccommodation procedure (Resolution CV), certain provisions of Article N12 will be suspended from January 1, 1982 to June 30, 1984. During this period HF fixed notifications will be considered in accordance with the provisions in Resolution CV. On July 1, 1983 the IFRB shall forward to each administration a proposed replacement frequency for each assignment that was annotated as requiring

reaccommodation. The IFRB shall make every effort to find replacement frequencies as quickly as possible and administrations will notify the IFRB of its agreement to the replacement or which of the replacements it finds unacceptable and the reasons therefor. The IFRB will continue to seek suitable replacement frequencies until July 1, 1984. After this date, an administration must find its own replacement frequencies. Finally, the change-over to the replacement frequencies shall occur not later than July 1, 1989 for the bands above 10 MHz, not later than July 1, 1994 for the bands below 10 MHz, and, the administration shall inform the IFRB of the date on which the change-over occurred.

8) The related Appendices by which frequency assignment data are submitted for coordination and notification purposes were also revised. The major change was the requirement for more information on terrestrial stations. Although not considered a regulatory matter, the adoption of the new method of designating emissions will affect the preparation of notices (see Resolution AK).

The provisions which require the submission of data for inclusion in the various specialized lists of the ITU such as the List of Coast Stations were not changed.

In summary, the U.S. made clear its appreciation and understanding of the problems of the developing countries and played a prominent part in the extensive negotiations required in developing acceptable compromises. These compromises will not have an adverse effect on U.S. interests, although it will cause an increase in workload both domestically and by the IFRB to carry out the clean-up and reaccommodation procedures.

c. Coordination and Notification of Space Service Stations

1) The Conference maintained without major changes the existing three stage process of advance publication, coordination, and notification for frequency assignments relating to space services. The Conference also approved the rearrangement of the procedures relating to space services into two Articles N11 and N13 which represents a considerable improvement and should facilitate their application by administrations. Articles N11 and N13 were considered in minute detail and a number of modifications were made to modify and somewhat simplify the procedures. The provisions dealing with the coordination and notification of terrestrial stations in bands shared with the space services underwent similar changes.

2) Generally speaking, the time periods specified in the regulations for actions or responses by administrations were extended in order to permit more time for compliance by administrations. For example, the period for comment on the advance publication of information by administrations was extended from ninety days to four months. Similarly, the period for examining the coordination data by an administration has been extended from ninety days to four months. Modifications were also made with the objective of ensuring that more complete information concerning space networks is made available to administrations on a timely basis as systems move through the advance publication and coordination phases.

3) Additionally, provisions were modified to more clearly indicate those cases where coordination is required so as to remove existing ambiguity. To ease the burden of coordination, based on experience gained to date in implementing new space systems, the number of situations where no coordination is required was expanded.

4) A provision was added to Article N11 which specifies that the IFRB is to provide certain technical assistance to administrations, particularly to an administration of a country in need of special assistance, in complying with the procedural requirements relating to advance publication and coordination of frequency assignments to space services. This should be of particular benefit to developing nations, for example, in the coordination of domestic earth stations working with domestic or international satellite systems.

5) In order to provide for automatic review of space radiocommunication entries in the MIFR, a provision was added to Article N13 whereby the IFRB, at intervals not exceeding two years, shall request confirmation from the notifying administration that its assignment has been and will continue to be in regular use in accordance with its recorded characteristics. This is intended to keep entries in the MIFR accurate and avoid cluttering the Register with erroneous or unused assignments.

6) New Article 13A was adopted introducing a procedure to be followed when a footnote to the Table of Frequency Allocations requires the agreement, before operating stations under the footnote, of another administration whose services may be affected. This procedure, which provides a means of identifying affected administrations, applies to both the space and terrestrial services.

7) The Final Acts of the 1977 Broadcasting Satellite WARC were brought into the Radio Regulations through adoption of a new Article 13B and a new Appendix 29A (see also Section VII G).

d. Space Services Conference

1) Although the regulatory procedures relating to space services were retained in essentially their same form, they were strongly criticized by developing countries which, in certain cases, favored adoption of formal plans to govern the implementation of space services. This issue was intensely debated during the Conference and led to the adoption of Resolution BP "Relating to the Use of the Geostationary-Satellite Orbit and to the Planning of the Space Services Utilizing It". The Resolution states "that a World Administrative Radio Conference shall be convened not later than 1984 to guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services".

2) A number of countries (India, China, USSR, Iraq, Afghanistan) proposed that a future WARC be convened to plan certain space services in certain parts of the spectrum. However, there was no agreement among them as to which services or bands should be planned. For example, China proposed that only the new allocations to the Fixed Satellite Service (FSS) below 10 GHz should be planned, whereas India proposed that the FSS including feeder links to the Broadcasting Satellite Service (BSS), would be planned in the entire 4/6 and 11/14 GHz bands. The USSR proposal was the most modest, with planning confined only to BSS feeder links. The Iraqi proposal was the most ambitious, embracing all space servibes in all frequency bands. A joint proposal by Colombia and certain other equatorial countries spoke of "adopting regulations guaranteeing rational and equitable access to the geostationary satellite orbit". It would also require prior agreement to the use of orbital positions over the territory of equatorial states. Proposals were also submitted during the Conference by Australia, Canada, and France relating to the use of the geostationary orbit.

Early in the consideration of the various proposals, it became clear that there was no opposition per se to the convening of a future space conference. Rather, the focus was directed at whether such a conference should have limited terms of reference confined to developing an *a priori* plan, or whether it should have broad terms of reference to admit consideration of a wide range of possibilities for guaranteeing equitable access.

3) The proponents of planning were generally in agreement that planning should lead to a detailed plan of orbital position and frequency allotments to countries in the fashion of the 1977 WARC plan for the BSS. Nearly all of the proposals justified the need for a plan on the claims that the geostationary satellite orbit was rapidly filling up in the 4/6 GHz band and that the present regulatory procedures, characterized as "first-come, first-served", would deny equitable access to developing countries in the future. India, which emerged as the leading proponent of planning, contended that it had paid a severe penalty in establishing their domestic satellite system and that the procedures of Article 9A did not adequately realize the principles of equity and access set forth in the ITU Convention.

4) Almost all of the developed countries, including most of the European countries which had supported planning for the BSS in 1977, spoke against the feasibility and desirability of planning for the FSS. They argued that the present regulatory procedures were not strictly first-come, first-served; that these procedures had worked well in the past and could be modified to work even better in the future; and that, if technology were not frozen through imposition of a plan, the geostationary orbit need not become so congested as to deny any country access to it. In addition, they argued that, if planning were to be considered at all, it should not be restricted to the type of detailed assignment plan used for the BSS in 1977.

5) Initially the equatorial countries maintained that new regulatory procedures, rather than planned assignments, were the key to ensuring equitable access. Subsequently, it became apparent that the equatorial countries and the proponents of planning had worked out an accommodation when Algeria proposed the "resolves" section of a resolution. It introduced as a "compromise" the idea of a two-session WARC whose first session would "establish principles, technical parameters and criteria for the planning of the orbit and frequency assignments for space services . . . taking into account relevant aspects of the particular geographic situation of equatorial countries". Although not so specified, the Algerian proposal in essence favored a priori planning with no alternatives. Its failure to consider any other approach than planning and no other type of planning mode but the allotment of frequencies and orbital positions made it unacceptable to the developed nations. The reference to equatorial countries also proved to be unacceptable to many countries which viewed it as a continuing attempt by the equatorial countries to build a case for their claim of sovereignty to that part

of the geostationary satellite orbit located above their territory. The U.S. and others considered the purported "compromise" as premature since the relevant working group had not yet addressed fully all the points within its terms of reference which, in addition to considering "the desirability, feasibility, and possibility of planning space services", was also to consider the "desirability, feasibility, and possibility of other approaches supplemental to the existing provisions of Articles N11 and N13".

6) In subsequent developments, India verbally presented a considerably broadened version of the Algerian proposal that included alternatives to planning, allowed the Space Conference to decide which services and bands should be planned, and did not specify the type of planning. The Indian proposal was accepted as a possible basis for final compromise and the chairman of the working group consulted with the representatives of fifteen of the nations most concerned with the issue (Afghanistan, China, Ecuador, India, Algeria, Iraq, Colombia, Kenya, Somalia, Nigeria, Canada, France, U.K., U.S., USSR). This consultation ultimately produced the resolves section of Resolution BP which, through the addition of paragraphs 3.3 and 3.4, represented from the standpoint of those opposed to a priori planning improvement over the original Algerian proposal since it permitted the consideration of regulatory procedures and other approaches to ensure equitable access. The problem with respect to the reference to equatorial countries contained in the Algerian statement was finally overcome so far as reaching agreement on the wording of the Resolution was concerned with the adoption of the phrase "taking into account the relevant technical characteristics concerning the geographical situation of particular countries".

7) A statement made by the U.S. concerning the "planning" aspects of Resolution BP is as follows:

> "The United States, in a spirit of compromise, can accept in general the proposed Resolution relating to the use of the geostationary satellite orbit and the space services using it. We believe that the text of the Resolution could have been further improved in several respects, but we recognize that it represents the result of lengthy discussion and reflects a sincere effort by all parties to accommodate diverse views.
>
> "The United States accepts the idea of a future space conference - the third since 1963 - as being in keeping with the dynamic development and utilization

of space communication technology. As stated many times in earlier discussions, the United States is of the view that the existing Radio Regulations are responsive to the spirit of Article 33 of the Convention and Resolution No. Spa2-1 of the Radio Regulations and have provided an effective mechanism for those administrations whose space services require access to the geostationary satellite orbit and the radio spectrum.

"However, we also recognize that the Radio Regulations have been criticized by some administrations, and we believe that there is always room for improvement based on experience with the actual application of the Regulations. Indeed, improvements to the Regulations have been undertaken at this Conference and undoubtedly further improvements will be found at the next Space Conference, since that Conference will have as one of its major mandates the establishment of improved regulatory procedures.

"There has been extensive discussion over the nature of the planning to be undertaken at the next Space Conference, and various explanations have been given as to what is intended. For its part, the United States views the planning mandate of the next Space Conference as being very wide in scope, admitting of a broad range of possibilities ranging from detailed orbit/frequency assignment plans to more dynamic planning approaches that will provide access to the orbit/spectrum in an equitable manner as the real requirements of administrations arise. While we are of the view that a flexible and dynamic planning approach will be more responsive to user needs, we believe that the Conference will be free to decide for itself the best approach for ensuring equitable access to the orbit/spectrum based upon careful and comprehensive technical preparations and analysis. In this regard, the full and active support of the CCIR will be indispensable.

"In deciding on the best planning approach, we trust that the future Space Conference will recall the grave problems foreseen by the United States, and also by a number of the countries who favored planning for the Broadcasting Satellite Service in 1977, if 1977 WARC-type planning were to be applied to the Fixed Satellite Service. I shall briefly summarize these difficulties for the record.

"Accommodation of long range requirements predictions with near-term technology

"A detailed orbit-frequency assignment plan would have to try to use proven, near-term technology to accommodate the sum-total of the long-range future requirements of all countries and groups of countries that might possibly want to operate satellite systems. Although the United States is certain that technological advances can expand orbit-spectrum capacity to accommodate all foreseeable real requirements as they arise, we acknowledge that 1984 technology will not be able to accommodate the grand total of 1999 requirements that a planning conference would face.

"Freezing of technology

"A 1977 WARC-type plan would freeze technology which, contrary to some assertions, is still in a state of rapid improvement in the 4/6 GHz band as well as other bands. This would deny the very increases in orbit-spectrum capacity and decreases in cost required for continued efficient and economical use of these limited resources that Article 33 tells us are essential for equitable access.

"Inhomogeneity

"Individual fixed satellite systems vary greatly in their characteristics. This inhomogeneity is intrinsic to fixed satellite networks. Such systems must accommodate in an economic and dynamic fashion a wide variety of numbers and types of channels, even within a single national system. This is why fixed satellite planning is radically different from and much more complex than the broadcasting satellite planning of 1977 which was based on the assumption of completely homogeneous systems.

"Unused orbit/spectrum resources

"Many assignments in a plan will come into use late in the life of the plan, if at all, either because terrestrial techniques will be more economical, or because national requirements may be met more economically by participation in an international or regional system. It is not accurate to say that assignments made to certain countries, which cannot be used for some time, will be made available to other countries. A plan necessarily ties a particular orbital position and frequency assignment to a specific coverage or service area. The interlocking nature of a plan would make it practically impossible for other countries to make use of unused assignments.

"Inflexibility

"The inflexibility of a detailed plan also makes it difficult if not impossible to modify a plan to provide assignments for new countries, or for new regional groupings of countries wishing to establish a shared system. Revision of a plan, if it is to be meaningful, will involve massive changes; it will necessarily be a complex, expensive and time-consuming process; it will need to balance the desire of then-existing systems to keep on operating against the possibility of cancelling assignments for the sake of a new plan. We believe that such substantial revision of a plan will be impractical, technically and economically. Thus, a plan will tend to institute, de facto, a permanent or semi-permanent priority, contrary to the principles stated in Resolution No. Spa2-1.

"For all of these reasons, the United States holds that the words 'planned' and 'planning' in the draft Resolution must be interpreted in a broad and flexible sense. With this interpretation of planning and with the obligation to consider a variety of alternative approaches to the use of the orbit-spectrum resource by space services, the next Space Conference can lead to the full realization of the objective of equitable access to the resource that the United States has always supported."

8) Thus, after extended debate, Resolution BP was adopted to hold a Space WARC whose principal goal was to guarantee equitable access to all countries and groups of countries. The Conference would take place in two sessions with the first session slated for about 1984 and the second session a year to a year and a half later. (Scheduling for future conferences is the responsibility of the Administrative Council of the ITU and the upcoming Plenipotentiary Conference, based on budgetary and other concerns. The date here is only a suggested date.) The first session would decide which -- if any, in the U.S. view -- services and frequency bands should be planned, and would be free to decide on the principles of

planning to be employed in each case, as well as the criteria and technical parameters for the planning. In the process of deciding where planning may be appropriate, other approaches to meeting the goal of equitable access would be considered, including improved regulatory procedures. The second session of the conference would then carry out the decisions of the first session. The proposed future conference to consider planning of space services using the geostationary satellite orbit has a mandate which appears to be satisfactorily broad to allow full discussion of alternative means of securing equitable access to the spectrum/orbit. It should be recognized, however, that pressures to adopt a priori planning for some of the FSS bands (4/6 and 11/14 GHz) which were manifest at WARC-79, will be very strong at the Space WARC and must be taken into account as the U.S. prepares for this conference.

e. Monitoring, Infringement and Harmful Interference Procedures

The role of the international monitoring service (Article N18) was increased at the WARC in three key areas:

1) To assist the ITU in "clearing" frequencies for new users;

2) In achieving increased technical tolerances and eliminating interference among shared services;

3) In controlling interference and establishing sharing criteria among users of the geostationary orbit.

Recommendation D, International Monitoring, was increased in scope to cover all frequencies in the spectrum as well as modified to encourage assisting the IFRB in determining which entries of the Master Frequency Register may be deleted in reaccommodating Fixed Service assignments so that additional broadcasting frequencies can be made available. Recommendation XH relating to practical needs of developing countries recommends that administrations make special efforts to furnish monitoring information and other technical assistance that would aid in obtaining proper frequency assignments (interference free or interference minimized).

Article 19 (Reports of Infringements) was carried forward with only minor amendments in order to clarify the existing text.

Article N20 (Procedure in a Case of Harmful Interference) was amended to reflect:

- that an administration shall acknowledge, by telegram, the receipt of a complaint of harmful interference.

Such acknowledgement shall not constitute an acceptance of responsibility for the harmful interference;

- new provisions relating to the elimination of harmful interference to safety services and, in particular, to transmissions on the distress and safety frequencies; and,

- a more detailed procedure to be followed by an administration in special need to determine the source of harmful interference.

Appendices 6, 7 and 8 (Reports of Monitoring, Infringements, and Harmful Interference) were amended to define more precisely the data required in these reports. The monitoring report (Appendix 6) was updated to allow for the gathering of information in the space radiocommunication services.

f. Resolutions

Three proposals concerning resolutions affecting regulatory matters were submitted by the U.S. Proposed Resolution AA was adopted in modified form (Resolution BV) consistent with U.S. objectives to recognize the difficulty involved in the advance publication, coordination and notification of information for the Amateur Satellite Service.

Proposed Resolution BB to update Resolution 5 relating to notification of frequency assignments was adopted (Resolution CA). Proposed Resolution CC related to changes in Appendix 1 concerning information on frequency assignment usage. Inasmuch as the Conference adopted our proposal for Appendix 1 in modified form, Resolution CC became inapplicable and was withdrawn.

G. Work of Committee 7 - General Administrative Committee

1. The work of Committee 7 dealt primarily with the general administrative and operational matters of the radio services, as well as with several other miscellaneous items not falling clearly under the work of the Technical, Allocations and Regulatory Committees. The changes to the Radio Regulations proposed by the U.S. in this category were intended to clarify and strengthen the intent of the provisions, to provide for the flexibility required by administrations, to eliminate superfluous regulations, and to provide for the safety of medical transports. The U.S. objectives in this area were nearly all satisfied.

2. A summary of our specific objectives and the Conference results is as follows:

a. Definitions and Nomenclature

Committee 7, working closely with Committees 4, 5 and 8, was also involved in the consideration of definitions and terminology. The specific changes, and in particular, new definitions added to the Radio Regulations, are discussed elsewhere in this report under the work of other Committees. However, the Committee did treat one question of substance in its deliberations, namely, whether the Conference was competent to make changes to definitions appearing also in the Convention. It was confirmed that the 1979 WARC could not modify the Convention; however, if the Conference decided to amend provisions of the Radio Regulations which are also covered in the Convention, it could submit a resolution to the Plenipotentiary Conference seeking a revision of the related text of the Convention. This served as a guideline throughout the Conference for the work of all Committees' relating to definitions.

The Conference adopted a new Article N2A concerning the nomenclature of dates and times used in radiocommunication. The new Article requires the use of any date to be in accordance with the Gregorian calendar, establishes an all-numeric format for representing the day, month and year and describes the method for using coordinated universal time (UTC).

b. Secrecy and Licenses

As currently written, Article N21/17 concerning the secrecy of radiocommunications was considered to be adequate for its intended purpose. The only change proposed by the U.S. was a modification to draw attention to the related Article of the ITU Convention, Malaga-Torremolinos, 1973. The Conference modified the Article to include a general reference to the appropriate provisions of the Convention.

The provisions of Article N22/18 which concern licensing of stations, were considered to be generally adequate and required few changes. The U.S. did propose some changes to this Article to allow flexibility for administrations in licensing and in complying with the secrecy requirements. The Conference did not accept all of the U.S. proposals; however, this is not expected to adversely affect the existing procedures of the Federal Communications Commission as the U.S. licensing authority.

c. Identification of Stations

Several changes were proposed to Article N23/19 in order to improve spectrum utilization. The proposed changes urged the early introduction of automatic identification methods in general and the observance of CCIR Recommendations for identification on frequencies for international use. Several other proposals relating to identification of stations were for the purpose of aligning the provisions with existing practices and to clarify their intent. Appendix C was considered adequate and no changes were proposed.

The Conference made substantial changes to Article N23. Provisions were added to encourage the use of automatic transmission of identification signals where practicable and in appropriate services. Other new provisions were added to clarify which radio services are required to use identification signals as well as the specific form of such signals. A major change to the Article was the adoption of a new system for Maritime Mobile Service identities, including national identification digits contained in new Appendix CA. The new maritime provisions are the result of several years of study in CCIR and CCITT. Finally, a number of minor changes were made to the sections dealing with the formation of call signs for the various radio services and stations.

Consideration of Article N23 was severely complicated by a political issue involving call signs. Both North and South Korea came to the Conference prepared to do battle over the assignment of call signs between the two countries. The North demanded one-half of the call sign series HLA-HMZ which had been assigned to the "Republic of Korea" since 1959 but which had previously been assigned to "Korea". Since the Democratic People's Republic of Korea was not a Member of the ITU at the time when the assignment was changed, it claimed the assignment was invalid for want of representation of its interests. South Korea resisted the 50-50 split on the grounds that the 1959 designation had been proper and that call signs had legitimately come to be associated with the Republic of Korea. The issue consumed excessive time and patience as each side lobbied every delegation repeatedly. The issue was finally settled by secret ballot on a compromise proposal initiated by the Republic of Korea. The compromise resulted in the splitting of the call sign series in half with a footnote in the call sign table (Appendix C) that the changes would be undertaken as soon as practicable and in any case be completed by January 1, 1984.

A second call sign issue involved the U.S. in a purely political matter. The Delegation was instructed to object to a Soviet proposal to re-designate the call signs of Lithuania, Latvia and Estonia to read "USSR" on the ground that we did not recognize the "forcible incorporation of these countries into the Soviet Union". The U.S. stood alone in this position and the Conference adopted the change as proposed.

d. Service Documents

Article N2[illegible]20 specifies the service documents to be published by the Secretary General. The U.S. proposed changes to these provisions that provided for computer access to this information and removed the assumption that only hard copy form is available. It was the U.S. view that significant cost reductions could result with the possibility of computer access. Proposals were also made to delete the requirements for the Secretary General to publish little-used documents in an attempt to reduce costs. The U.S. proposed consequential changes to Appendix 9 contingent on the proposals to delete certain service documents.

The Conference adopted a modification to the Article which provides for the availability of published information in alternative forms, for example, computer tapes. The modification was agreed on the condition that in the application of this provision, the Secretary General would ensure that in no way would there be direct access to any part of the Master International Frequency Register, with the exception of those parts contained in published lists. Provisions for the publication of the Manual for Use by the Maritime Mobile and Maritime Mobile Satellite Services were included in Article N24. Other changes were made to the Article to clarify the publication schedule for the various lists.

With respect to Radiocommunications Statistics, the Conference noted that the General Secretariat had ceased the publication of a separate document and that the information was now included in the Annual Yearbook of Telecommunication Statistics. The Conference endorsed the continuation of this action.

e. Miscellaneous and Special Services

In general, it was not intended that the 1979 WARC would treat Articles pertaining to a single service since these regulations are better handled at a specialized WARC. However, a number of Articles relating to a single service were specifically included in the Conference agenda because they had not been reviewed since the 1959 Conference. The Articles are as follows: Article N30/41, Amateur Service and Amateur-Satellite Service; Article N31, Standard Frequency Service and Time Signal Service; Article N32/42, Experimental Stations; Article N33, Radiodetermination Service and Radiodetermination Satellite Service (selected sections); and Article N39, Special Services Relating to Safety.

The U.S. proposals relating to the Articles listed above were minimal and generally minor in nature. Most of the proposed changes were intended to strengthen or clarify the intended purpose of the provision. The most significant U.S. proposal concerned the Article dealing with the Amateur Service. It was proposed that the mandatory Morse Code requirement for amateur operators be deleted and that the Regulation be modified to make the Code requirement a recommended practice. The Conference did not accept this proposal.

Changes to the Articles relating to miscellaneous and special services that were adopted by the Conference are minor and fully acceptable to the U.S. In Article N30/41, a provision was added which forbids the use of amateur stations for transmitting international communications on behalf of third parties; however, the existing paragraph which permits special arrangements between administrations of countries concerned is applicable in this case. Another new provision in this Article extends the existing provisions concerning licensing and operating procedures in the Amateur Service to the Amateur Satellite Service. The Conference made no significant changes to Articles N31 and N32/42. Article N33 concerning radiodetermination was modified to add new regulations which extend most of the existing general provisions to the Maritime and Aeronautical Radionavigation Satellite Services. Finally, the Conference adopted only minor editorial changes to Article N39 dealing with special safety services.

f. Entry into Force of the Radio Regulations

Committee 7 was responsible for revision of Article N73 concerning the effective date of the new Radio Regulations. The results of the Conference decisions on this matter are discussed in Section XIII of this report.

g. Medical Transport

Committee 7 also considered proposals on the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Convention and any additional instrument of the Convention. In this regard, Protocol I of the 1977 Diplomatic Conference on Humanitarian Law specified the protection requirements.

In order to satisfy these requirements and in accordance with results of the SPM, the U.S. proposed modifications and additions to Articles N12/9, N23, N37 and N39. The changes generally applied to the notification of frequencies, identification of stations, general provisions for identifying medical transports, and the content of the medical transport message. The Conference adopted optional procedures which fully satisfy the requirements for medical transport. Most of the new provisions are contained in a new section in Article N37 and the title of that Article was modified as follows: "Urgency and Safety Transmissions. Transmissions Relating to Medical Transports". Appropriate changes were also made to a number of other articles in the Regulations.

h. Program of Future Conferences

The agenda for the 1979 WARC included an item to recommend a program of future administrative radio conferences to deal with specific services with a view to presenting advice to the Administrative Council and subsequently to the Plenipotentiary Conference. The U.S. did not submit specific proposals to the Conference concerning this item, although it recognized that a series of specialized conferences would be necessary in order to implement the decisions of the Conference, to update the operational regulations as required by these changes, and to provide for future growth of specific services. The Delegation participated fully in the related discussions and a report of the results is given in Section IX of this report.

i. The Final Acts of the 1977 Broadcasting Satellite WARC

Committee 7 was tasked with consideration of Resolution No. Sat-4 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977 which called for the incorporation of the Final Acts of that Conference into the Radio Regulations without substantial change. This action was taken by the Conference through a number of changes to the Regulations. The basic provision in the body of the Regulations is contained in a new Article N13B concerning coordination, notification and recording of frequency assignments to stations of the Broadcasting Satellite Service in the 12 GHz band. The single provision in this Article calls attention to the provisions and associated plan now contained in new Appendix 29A. Consequential changes were made in Articles N11, N12 and N13 with regard to the Broadcasting Satellite Service provisions.

Appendix 29A includes nearly the entire Final Acts of the 1977 Broadcasting Satellite WARC as consequentially amended to reflect incorporation of these Acts into the Regulations. The interim provisions for Region 2 that are contained in the new Appendix 29A are modified by Resolution C1 to take into account changes made by the 1979 WARC to the Table of Frequency Allocations for Region 2 in the band 11.7-12.7 GHz. Resolutions CH, CJ and CK are also applicable to the new Article N13B and the new Appendix 29A.

H. Work of Committee 8 - Restructure Committee

The Committee had a relatively short agenda and a small number of specific proposals to consider, compared to the other substantive Committees, and its work was non-controversial. Both items in its terms of reference had been thoroughly studied by earlier ITU bodies and had received wide acceptance internationally prior to the WARC. The issues were as follows:

1. Rearrangement of the Radio Regulations

a. The United States was an active participant in the Group of Experts that met in January 1976 to rearrange the Radio Regulations in accordance with Resolution No. 768 of the 30th Session of the Administrative Council. The Rearrangement, which was considered by the 1977 Broadcasting Satellite WARC and adopted in principle as the basis for discussions at the 1979 WARC (Resolution No. Sat-10), reflected the best efforts of those knowledgeable in the Radio Regulations. As in all ITU deliberations the final product represented a number of compromises by the experts to obtain a unanimously agreed report. In addition, in separating the administrative regulations from the operational regulations and the latter by the various services concerned, it was necessary to leave some of the editorial refinement and the deletion of redundant information to the 1979 Conference because of the limited terms of reference of the Group of Experts. It was also necessary due to the press of time for the Group of Experts and the 1977 WARC to leave to the 1979 Conference any further refinement of the Rearrangement itself.

b. The U.S. fully supported the adoption of the Rearrangement and was opposed to consideration of any major changes. In general, our proposals dealt with minor refinements and consequential revisions resulting from the Rearrangement, and several minor changes necessary to correct errors in the Rearrangement. The U.S. proposed suppression of a number of redundant provisions from the Aeronautical and Land Mobile chapters and other editorial refinements. To avoid making substantive changes the Group of Experts triplicated the general Mobile Service provisions in the Aeronautical, Maritime and Land Mobile chapters with the understanding that any provisions that are not applicable to a particular chapter would be treated by the first competent WARC. It was with this understanding that we submitted our proposals.

c. In the course of the work by the Group of Experts a number of recommendations were made to improve the format of the Radio Regulations. The U.S. supported all the recommendations contained in the report of the Group of Experts. In particular, it was felt to be useful to leave blocks of unallocated marginal serial numbers at the end of each article to accommodate expansion of the Regulations and to group Resolutions and Recommendations by conferences of the same type. In rearranging the Radio Regulations, a small number of provisions were duplicated exactly for informational purposes at other places in the Regulations. The U.S. proposed that a footnote be added to each duplicate provision which would read: "This provision is a duplicate of the main provision and can be modified or deleted only as a consequence of a change to the main provision". The provisions that have been duplicated but slightly modified would be considered independently of each other and did not need such a footnote.

d. The basic structure was adopted immediately and unanimously by the 1979 WARC. The concept of two parts -- A and B -- was retained, noting that together they form the Radio Regulations and are fully equal in status. Appendices were located at the end of the Regulations, rather than divided and placed at the end of Part A or B as appropriate as some countries proposed. It was agreed that marginal numbering should begin at 1. It was left to the Secretary General to assign the marginal numbers after the Conference was completed and to place unused blocks of numbers after each section in Article N1 (Definitions) and at the end of each article. The objective was to make it easier to add new regulations at future conferences without going to complex alphanumeric designators which required up to three digits and three letters for certain provisions adopted by earlier conferences.

e. A number of proposals submitted for the Rearrangement were considered to be beyond the competence of the Conference and therefore rejected. For example, there was a series of proposals that dealt with the maritime distress frequencies, including some of the U.S. proposals. The Delegation, acting jointly with the UK Delegation, submitted revised proposals that were within the Conference's guidelines with respect to competency. This action expedited the work of the Committee considerably. All U.S. proposals for the Rearrangement were adopted or handled in a fully acceptable manner.

2. Accounting Provisions

a. The 1974 Maritime WARC adopted a number of changes to the maritime accounting provisions of the Regulations; however, agreement could not be reached on several important issues. The

Conference therefore adopted a Resolution calling on the CCITT as a matter of urgency to study what changes to the principles and methods of accounting for maritime public correspondence are necessary to improve the present system and to provide the results prior to the 1979 WARC.

b. The CCITT studied this issue in considerable detail in the period following the 1974 Maritime WARC. Provisional recommendations were developed by the CCITT and approved by correspondence within that body. They proposed changes that would restructure the framework of ITU provisions dealing with accounting and operating procedures for public correspondence in the Maritime Mobile Service. These changes transferred from the Radio Regulations and the Additional Radio Regulations to the CCITT Recommendations, all such procedures which do not require continued regulatory status. Such transfer would permit easier revision of accounting and operating procedures to respond to future needs and circumstances. Specific changes were also made to some CCITT Recommendations that improved the methods of charging, accounting and refunding. The U.S. fully supported the CCITT Recommendations and submitted proposals to suppress several articles of the Radio Regulations and to incorporate the CCITT's recommended regulatory provisions into the Regulations as a new Article N62A.

c. The Committee considered the Report of the CCITT Director on this matter and quickly endorsed its Recommendations, leaving the difficult question of the extent to which certain articles of the Radio Regulations and the Additional Radio Regulations might be deleted. Concern was expressed that the CCITT studies only considered the Maritime Mobile Service whereas some of the articles proposed for deletion were applicable to the Aeronautical and Land Mobile Services. It was recognized, however, that there was very little if any international public correspondence in the latter two services at this time, with the exception of aircraft working into coast stations that must follow the maritime procedures in any event. There was also a strong sentiment to simplify the Regulations and to make the operating and tariff provisions easier to change, such as they would be if transferred to CCITT Recommendations.

d. The Committee agreed to delete Articles N69, N70, N71 and N72 and adopted a Resolution to ensure that services other than maritime were covered until a more permanent solution could be developed by the CCITT. A new Article N62A, containing the basic regulations for accounting and appropriate linkage to the CCITT Recommendations, was adopted. As a result of these actions, a number of existing Resolutions and Recommendations were deleted. Finally, new Resolution AC relating to the eventual abolition (called for on December 31, 1987 in current CCITT work) of mobile station charges for public correspondence in the Maritime Mobile Service was approved.

e. The Committee also agreed that the entirety of the Additional Radio Regulations (ARR) should be deleted. The ARR is a separate body of administrative regulations annexed to the ITU Convention, along with the Radio Regulations and the Telegraph and Telephone Regulations. They have existed as a separate entity for many years and past conferences treating the ARR have adopted separate Final Acts containing the changes. The reason for the existence of these Regulations is that the U.S. and a few other countries could not agree to the provisions relating to tariffs due to a conflict with domestic law and regulations. As an expediency, the unacceptable Regulations were segregated from the Radio Regulations and the U.S. has never ratified the ARR or signed the relevant Final Acts. Therefore, the Delegation was pleased with this Conference decision.

I. Work of Committee 9 - Editorial Committee

1. Committee 9 held its first meeting in the second week of the Conference to discuss its terms of reference and organization. In accordance with tradition, the Committee was chaired by France. Delegates from the UK, Spain and the U.S. and officials of the ITU General Secretariat participated actively. The purpose of the Committee was to consider every text approved by the five substantive Committees of the Conference — Committees 4, 5, 6, 7 and 8 -- and to submit to Plenary texts altered pursuant to its terms of reference.

2. There were two notable differences from past conferences regarding the Editorial Committee of the 1979 WARC. First, there were drafting groups set up in several of the substantive Committees in an effort to align the texts at a much earlier stage in the Conference deliberations. This proved to be very useful since the drafting groups consisted of specialists very familiar with the matter under consideration. The members of the Editorial Committee, as generalists, were able to pay less attention to the technical accuracy and devote themselves to the examination of the texts from the point of view of comprehension by future readers. The second difference was the unexpected but welcome participation by other delegates — from the Ivory Coast, Nigeria, Argentina and Venezuela — who desired to take an active role in this important function.

3. The Committee began meeting regularly about midway through the Conference. In addition to treating the early decisions of other Committees during this period, it carried out a complete, methodical examination of all provisions to identify and correct

serious differences in translation between the three official language versions of the Radio Regulations. This review revealed a number of serious inconsistencies that had developed over the years and were not detected at the various specialized conferences. As is typical of all ITU administrative radio conferences, the workload greatly increased in the last few weeks, requiring the Committee to divide into two or three parts and to extend their sessions long into the night in order to process their texts. The product of their work is reflected in the more than 1100 pages of the Final Acts of the Conference.

VIII. WORK OF THE CONFERENCE (PLENARY SESSIONS)

A. Most of the substantive work of the Conference took place at Committee, Working Group and sub-Working Group levels and is described in Section VII. The vast majority of work in Plenary involved the approval of texts adopted by the main Committees and edited by Committee 9. Unfortunately, this work was often difficult and tedious, due in large part to the unfamiliarity of the Chairman and many delegates with the Radio Regulations. There were long, unnecessary discussions in the first readings of text, and the sessions were often marked with confusion, misunderstanding and misinterpretations. The situation was much improved in the final Plenaries dealing with the second readings where the pace of work became more quick and orderly.

B. The first Plenary meeting, which was scheduled for Monday, September 24, was not held until late in the afternoon on Thursday, September 27, due to the delay in reaching agreement on a slate of officers. In accordance with the Convention, the Conference was opened by the oldest head of delegation, Mr. Per Mortensen of Norway. He announced that the meeting of the heads of delegation had unanimously decided to propose Mr. Severini for Chairman, who was accepted by acclamation and took the chair for the rest of the Conference. Following the election of Vice-Chairmen, opening addresses were given by Secretary General Mili, IFRB Chairman Fujiki, and CCIR Director Kirby. The Conference structure and organization and the slate of officers for Committee Chairmen and Vice-Chairmen were adopted as recommended by the meeting of the heads of delegation. The Credentials Committee was directed to submit a final report not later than November 19. The customary working hours of 0900-1200 hours and 1400-1700 hours were adopted for the 1979 WARC.

The Plenary took note of a message from the President of the United States transmitted to the Secretary General with his good wishes for the work of the Conference. The first Plenary closed after a number of statements were presented as follows:

1. The U.N. representative read a message from the Secretary General of the United Nations stressing the vital role of communications for developing countries, congratulating the ITU on its continuing efforts to encourage and promote the use of telecommunications to the advantage of all nations, and sending his best wishes for a rewarding conference.

2. The delegate from Colombia presented a statement that repeated its claim regarding the sovereignty over the geostationary orbit above their territory. He pointed out that the WARC was not competent to allocate positions on the geostationary orbit to individual countries and that the U.N. Committee on the Peaceful Uses of Outer Space is dealing with the legal aspects of this matter. In general, he noted that communications has gained political importance and that ITU conferences no longer have mere technical implications. The Colombian delegate stated that politics is increasing in the ITU and that this trend cannot be avoided.

3. The delegate of Costa Rica commented about the injustice of the present communications systems and the distribution of frequencies among nations. She spoke of the control and exploitation of the geostationary orbit by a few nations (not identified) at the expense of the developing nations. While briefly stating that the Conference does indeed have a technical base, the Costa Rican delegate declared that the distribution of frequencies and the regulatory structure is obviously political. She said that social, economic and political factors must now set the priorities for the WARC.

4. The delegate of Afghanistan made a statement praising his new Government. Mention was also made of Afghanistan's under-developed condition and the need for the Conference to give special concessions in the HF and VHF bands.

C. The second Plenary meeting was not held until the seventh week of the Conference, when sufficient texts had been approved by the Committees to justify consideration by the Plenary. The second and subsequent Plenaries were essentially uneventful, dealing with the series of texts submitted by the Editorial Committee for first reading. The treatment of the documents was painfully slow due to constant minor interventions which dragged out discussion much beyond what was necessary. However, during the second Plenary the Greek delegate made a strong statement expressing his concern at the lack of additional allocations to the Maritime Mobile Service, particularly in the MF and HF bands. He cited a similar problems for the HF Broadcasting Service. He pleaded for the support of all delegations to avert disaster by providing the necessary increases for the two services. There was no discussion of his statement and the request obviously went unheeded by the majority of countries. Also, in the second Plenary, a statement from the Minister of Posts and Telecommunications of the Ivory Coast was noted, a lengthy address was delivered by the observer for UNESCO, and a short statement was delivered by the observer for the World Health Organization.

D. The final Plenary meetings generally moved quickly through the second reading of texts. It was obvious that the long Conference was taking a heavy toll on the strength and interest of the delegates. At certain times during the last week there was no work to be considered due to the delay in reproducing and distributing texts, while at other times the Plenary worked late in the evening to process whatever was available. The most significant substantive decision taken at Plenary was probably the question of allocations in the 3.4-3.7 GHz and 4.5-4.8 GHz bands, which overturned an earlier decision at Committee 5 level and resulted in a compromise acceptable to the U.S. Another item which introduced much heated discussion in the last working Plenary meeting concerned the Protocol statement (No. 79) submitted by Colombia and other equatorial countries. In general, while the principal discussions and decisions were taken at the Committee level, the Plenary sessions tended to be long and tedious.

E. The final Plenary was held on Thursday, December 6, 1979 at 6:40 p.m. for the signature ceremony and the formal closure of the Conference. The Final Acts and Final Protocol were signed by 132 heads of delegation, some of whom did so in advance. Closing speeches were made by Secretary General Mili, Mr. Jipguep, current Chairman of the Administrative Council, and Mr. Severini. The Conference was concluded at 8:10 p.m.

IX. FUTURE MEETINGS

A. For the first time at any WARC the agenda called for the Conference to propose to the Administrative Council and to the next Plenipotentiary Conference a program for convening future administrative radio conferences to deal with specific services. This item was handled in Committee 7. Contrary to popular belief, the decision to recommend a series of future specialized conferences was not an "escape route" for unresolved issues, but rather, it was a necessary exercise in recognition of the fact that the 1979 WARC did not have the mandate to carry out planning, to review the general Mobile Service provisions (which comprise about half of the volume of the Regulations) or to treat certain other parts of the Radio Regulations.

B. The 1979 WARC adopted a number of resolutions and recommendations laying out each specialized world or regional conference, a suggested agenda and in most cases a tentative date. The program of future conferences is summarized in Recommendation XM. The following is a list of the administrative radio conferences agreed with the relevant resolution or recommendation given in parenthesis:

1. WARC for the Mobile Services (Resolution DH).
2. WARC for Planning of the HF Broadcasting Bands - two sessions (Resolution DI).
3. WARC on the Use of the Geostationary Satellite Orbit and the planning of Space Services Utilizing It - two sessions (Resolution BP).
4. Region 2 Medium Frequency Broadcasting Conference - final session (already arranged for November 1981).
5. Region 2 Broadcasting Satellite Planning Conference (Resolution CH).
6. Planning Conference for Sound Broadcasting in the Band 87.5 - 108 MHz for Region 1 and certain countries in Region 3 (Resolution BM).
7. Regions 1 and 3 Conference for Planning Feeder Links to Broadcasting Satellites in the 12 GHz Band (Resolution BQ).
8. Region 3 Conference to Establish Sharing Criteria for the Use of VHF and UHF Bands (Resolution DK).
9. Conference to Revise the Plan of the Copenhagen Convention (1948) for the European Maritime Area (Recommendation YD).
10. Conference Concerning the Provisions of the African VHF/UHF Broadcasting Conference, Geneva, 1963 (Resolution CQ).
11. Region 2 Planning Conference for Broadcasting in the Band 1605-1705 kHz (Recommendation YC).
12. WARC Concerning the Frequency Allotment Plan of the Aeronautical Mobile (OR) Service (Recommendation YF).

C. The program of future conferences is very ambitious and may be impossible to follow in practice. It places a heavy preparatory burden on all administrations, particularly on developing countries. It will be very difficult to carry out adequate and complete technical preparations by the CCIR and the IFRB which have already been heavily tasked by the 1979 WARC decisions. Personnel and budget resources in both the ITU and individual administrations are probably insufficient to meet the proposed schedule, or, at best, will be severely strained.

D. In the end, the U.S. Delegation agreed to all the resolutions and recommendations laying out the conference schedule. Each conference involving Region 2 (Western Hemisphere) will treat radio matters of at least substantial — and sometimes vital -- interest to the United States. Active participation in all such radio conferences is essential for the U.S. in order to serve and protect our national interest and because of our strong commitment to international agreement and harmony in the use of the frequency spectrum and the geostationary orbit. It is, therefore, very important that the concerned Government agencies, private industry and the affected radio user groups be aware of the program described above and carry out early planning to ensure adequate resources are available to prepare for and participate in the various conferences.

E. The U.S. must also prepare for a series of follow-on bilateral and international meetings arising from the 1979 WARC. These meetings will arise in three main areas: changes to existing agreements, implementation of new services and frequency bands, and preparation for future conferences. They will involve bilateral discussions with our neighbors, Canada and Mexico, as well as multilateral meetings in the Region (CITEL) and with our NATO allies. There will also be substantial activity in the CCIR and the various international service organizations (INTELSAT, IMCO, and ICAO) in preparation for the future conferences.

X. IMPACT ON THE ITU PERMANENT ORGANS

A. CCIR: A tremendous work program is laid out in twenty-six Resolutions and forty-nine Recommendations adopted by the 1979 WARC, involving a large number of new studies and action items by the CCIR, as well as many issues currently under study. Most of the new tasks can be grouped in several categories, as follows:

1. Preparation for all future administrative radio conferences, including several issues that must be studied on an urgent basis due to the early date of the relevant conference. Some future conferences may require a special joint meeting of the CCIR Study Groups such as that held prior to the 1979 WARC.

2. Study of various technical regulations, including space/space and space/terrestrial sharing criteria, calculation of coordination distances, frequency tolerances, spurious emission levels, emission designators, and necessary bandwidths. A new feature of CCIR activity is the automatic updating of propagation data in Appendix 28 following each Plenary meeting. Another new task of the CCIR is to study the IFRB's technical standards on a case-by-case basis when disagreement arises, and issue an appropriate recommendation.

3. General study of technical definitions, with a specific request to define terms for "channel", "service area" and "coverage area".

4. Issues related to allocation matters such as the technical basis for division of the world into Regions, protection from ISM equipments, characteristics and preferred bands for sound broadcast satellites in the 500 - 2000 MHz band, and the use of certain radionavigation bands.

5. Technical cooperation and assistance, e.g., development of specifications for low cost television receivers and preparation of a handbook for computer-aided techniques in radio frequency management.

6. Miscellaneous items, two of which are of particular interest to the United States. The first recommends the CCIR undertake studies on the transmission of electrical power from space (solar power satellites) and make appropriate recommendations (Recommendation XO). The second requests the CCIR to develop a standard method of implementing a system for automatic identification of stations (Recommendation XN).

B. IFRB: There was a substantial increase in the tasks to be performed by the Board as a result of WARC decisions. At the same time there was little if any reduction in existing functions assigned to the Board. Therefore, it is anticipated that the IFRB will require additional personnel and/or resources for the next few years to carry out its responsibilities. The substantial increase in workload results primarily from the following decisions:

1. Clean-up of the Master Register in the bands allocated to the Fixed Service between 3000 and 27,500 kHz (Resolution CT);

2. Review of frequency assignment entries in the Master Register resulting from decisions of the 1959 Conference for conformity with the revised Allocation Table (Resolution CU);

3. General review of all frequency assignments in the Master Register for conformity with the revised Table of Frequency Allocations;

4. Reaccommodation of affected frequency assignments in the HF Fixed Service as a result of reallocations to the Maritime Mobile and Broadcasting Services (Resolution CV);

5. Preparation of a handbook to help administrations apply the regulatory procedures of the Radio Regulations (Resolution BW), and other explanatory information (Resolution AK and Recommendation K);

6. Provision of technical assistance and the preparation and organization for future conferences, particularly those dealing with planning of various services. This includes the receipt and processing of frequency requirements and the development of planning methodology and computer programs.

XI. TECHNICAL COOPERATION AND ASSISTANCE

A. During the course of the Conference there was a strong sentiment on the part of delegations from developing countries that there should be new or increased efforts to assist them with technical cooperation and assistance in the field of telecommunications. In particular, they were keenly interested in achieving their rights, as well as in meeting their responsibilities, under the ITU Radio Regulations. The primary means of expression were the various resolutions and recommendations described below that they drafted and the Conference adopted. However, provisions were also inserted directly in the body of the Regulations. An example is the addition of a provision in Article N11 which specifies that the IFRB is to provide certain technical assistance, particularly to administrations of countries in need of special assistance in complying with the procedural requirements relating to advance publication and coordination of frequency assignments to space services.

B. The Conference adopted fifteen resolutions and recommendations that relate directly to technical cooperation and assistance to developing countries. They may conveniently be divided into several categories as follows:

1. Application of the Radio Regulations:

    -- Resolution BW, Relating to the preparation of a handbook to explain and illustrate the procedures of the Radio Regulations.

2. National Radio Frequency Management:

    -- Resolution DD, Relating to the development of national radio frequency management.

    -- Resolution BX, Relating to the introduction and development of computer assistance in radio frequency management within administrations.

    -- Recommendation YG, Relating to a handbook for computer-aided techniques in radio frequency management.

    -- Recommendation XH, Relating to the practical needs of countries in need of special assistance.

3. Operation of Networks:

    -- Resolution BZ, Relating to improvements in assistance to developing countries in securing access to the HF bands for their Fixed Services and in ensuring protection of their assignments from harmful interference.

    -- Resolution CF, Relating to CCIR study of lightning protection of radio equipment.

-- Resolution CG, Relating to technical cooperation with the developing countries in the study of propagation in tropical areas.

-- Resolution CZ, Relating to international cooperation and technical assistance in the field of space radiocommunications.

— Recommendation ZN, Relating to the standardization of the technical and operational characteristics of radio equipment.

— Recommendation YI, Relating to the means of reducing the congestion in band 7 (3 - 30 MHz).

4. Development of Telecommunications:

-- Resolution CE, Relating to technical cooperation with the developing countries in maritime telecommunications.

-- Resolution CX, Relating to the role of telecommunications in integrated rural development.

5. Preparation of Equipment Specifications:

-- Recommendation ZP, Relating to specifications of low cost television receivers.

6. Technology Transfer to Improve Services of All Kinds:

— Resolution BG, Relating to the transfer of technology.

C. The U.S. actively supported some of the resolutions and recommendations, and joined in the consensus adoption of the others. It is clear that cooperation and assistance which yields an increased knowledge and improved understanding of technology, operation, and frequency management will result in more efficient and orderly use of the radio frequency spectrum, to the benefit of all ITU Members. The main concern of the Delegation was to ensure wording in the resolutions and recommendations consistent with our policy that funding be provided by the U.N. Development Program and other voluntary sources, and that the ITU not become directly involved in technical assistance. This objective was generally achieved.

D. Based on discussions during WARC, it is fully expected that the subject of technical cooperation and assistance will become increasingly important to the majority of ITU Members. Therefore it will be a major issue at the upcoming administrative radio conferences, the annual Administrative Council sessions, and the Plenipotentiary Conference scheduled for October 1982. This is an area where the U.S., including private industry, can take the initiative to develop appropriate and cost-effective programs -- unilaterally or in conjunction with the ITU, UNDP or other organizations -- that will improve our image and working relationship with developing countries at future ITU conferences.

XII. FINAL PROTOCOL

A. A total of fifty-one statements for the Final Protocol involving eighty-one countries were submitted during the period allowed for filing reservations on the decisions taken by the 1979 WARC. In addition, thirty-two counter-reservations involving sixty-three countries were submitted in the following twenty-four hour period. All eighty-three statements for the Final Protocol were noted in Plenary without discussion, with the single exception of No. 79 regarding the claim of equatorial countries to sovereignty over the geostationary orbit above their territory, which is discussed below.

B. The U.S. submitted reservations on a small number of Conference decisions where it was felt that the decisions taken could adversely affect an important national communications requirement. These reservations are as follows:

1. The major reservation (Protocol No. 38) involved changes to the Table of Frequency Allocations and reads as follows:

> "The delegation of the United States of America formally declares that the United States of America does not, by signature of these Final Acts on its behalf, accept certain decisions taken by this Conference in regard to the Table of Frequency Allocations and the associated footnotes, and therefore, the United States of America:
>
> "1. In view of the fact that this Conference has failed to provide adequate allocations for the HF broadcasting service, particularly at 6 and 7 MHz, reserves on this matter as indicated in a separate statement made jointly with the delegations of Saudi Arabia, Cyprus, Spain, Greece, the United Kingdom, Sri Lanka and Zambia;
>
> "2. Reserves the right to operate stations in the mobile satellite service in the frequency range 235 to 399.9 MHz as indicated in a separate statement made jointly with the delegations of the Federal Republic of Germany, Belgium, Denmark, Greece, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom and Turkey;
>
> "3. In the operation of stations in the radiolocation service on a primary basis in the bands 430 - 440 MHz, 5 650 - 5 850 MHz, 8 500 - 8 750 MHz, 8 850 - 9 000 MHz, 9 200 - 9 300 MHz, 9 500 - 9 800 MHz, 10 000 - 10 500 MHz, 13.4 - 14 GHz, 15.7 - 17.3 GHz and 33.4 - 36 GHz, cannot guarantee protection to or coordination with other services;

"4. Reserves the right to operate stations of the fixed, mobile and radiolocation services on a primary basis in bands as specified in the footnotes pertinent to frequency bands 470 - 806 MHz and 890 - 960 MHz, without the condition specified in these footnotes that make such operations subject to agreement under Article N13A. The United States will coordinate its usage of such services with neighbouring administrations which are affected;

"5. In view of the fact that the Conference failed to provide adequate allocations for the HF maritime mobile service, particularly below 12 MHz, states its intention to satisfy maritime mobile requirements in the several HF bands below 10 MHz allocated to the mobile service on a primary basis."

2. The joint statement regarding HF broadcasting (Protocol No. 36), referred to in sub-paragraph 1 of No. 38 above, is as follows:

"In the view of the above-mentioned administrations /Saudi Arabia, Cyprus, Spain, the United States, Greece, the United Kingdom, Sri Lanka and Zambia/ this conference has failed to make adequate provision for the needs of the HF broadcasting service in the revised allocations, particularly at 6 and 7 MHz. Unless authority is given to the proposed HF Broadcasting Conference, by its agenda, for it to make use of some parts of the spectrum allocated to the fixed service, that Conference will not be able to plan all frequency bands to enable countries to sustain their broadcasting services in the face of varying propagation conditions throughout the solar cycle. In the absence of an adequate plan, the above-mentioned administrations reserve their right to take the necessary steps to meet the needs of their HF broadcasting services."

3. The joint statement by NATO countries regarding the operation of mobile satellite systems in the band 235-399.9 MHz (Protocol No. 32), referred to in sub-paragraph 2 of No. 38 above, is as follows:

"The above-mentioned administrations /Federal Republic of Germany, Belgium, Denmark, the United States, Greece, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom and Turkey/ reserve their right to operate systems in the mobile satellite service in the frequency range 235-399.9 MHz under the provisions of the relevant footnote to the Table of Frequency Allocations, subject only to coordination as prescribed in Article N13A. The additional provision of this footnote imposes a condition of non-interference which could lead to a request to cease operation of a previously coordinated satellite system in the case where an administration, despite having agreed to such a satellite system, puts into service or merely plans a system that might receive harmful interference. Such a condition is unacceptable to the above administrations."

C. The U.S. Delegation, upon instructions from the Department of State, also submitted a statement (Protocol No. 39) for the record regarding intentional jamming of some of our international broadcasts in the high frequency bands. It is noteworthy that this subject did not arise at any time in discussions during the Conference, although Israel made a reference to jamming in their statement for the Final Protocol. The U.S. reservation is as follows:

> "The administration of the United States of America, calling attention to the fact that some of its broadcasting in the high frequency bands allocated to the broadcasting service are subject to willful harmful interference by administrations that are signatory to these Final Acts, and that such interference is incompatible with the rational and equitable use of these bands, declares that for as long as this interference exists, it reserves the right with respect to such interference to take necessary and appropriate actions to protect its broadcasting interests. In so doing, however, it intends to respect the rights, to the extent practicable, of administrations operating in accordance with these Final Acts."

D. Colombia and seven other equatorial countries submitted an initial statement (Protocol No. 40) regarding their sovereignty claim to the geostationary orbit above their territory. Indonesia submitted a separate statement (Protocol No. 42) on the same subject. The U.S. in close coordination with several other countries developed a counter-statement consistent with our policy in the U.N. Outer Space Committee, and submitted it jointly with twenty-two other countries in reply to the two statements mentioned above. However, Colombia, et al, submitted a further statement (Protocol No. 79) that implied recognition of the equatorial countries' claim in Resolution BP relating to the Space WARC. The U.S. and others objected to the Colombian action in Plenary and sought to have it rejected since it was not a counter-statement to any submitted earlier. The issue was finally resolved by revising the twenty-three country joint statement to counter the latest Colombian move. The final counter-statement (Protocol No. 75) submitted by the U.S. and others is as follows:

> "The above-mentioned delegations /Federal Republic of Germany, Australia, Austria, Belgium, Canada, Denmark, the United States, Finland, France, Greece, Ireland, Italy, Japan, Liechtenstein, Luxembourg, Norway, New Zealand,

> Papua New Guinea, the Netherlands, Portugal, the United Kingdom, Sweden and Switzerland7/, referring to the reservations made by the Republic of Colombia, the People's Republic of the Congo, the Republic of Ecuador, the Gabon Republic, the Republic of Kenya, the Republic of Uganda, the Somali Democratic Republic and the Republic of Zaire in statement No. 40 and by the Republic of Indonesia in statement No. 42, consider that, in as much as these statements refer to the Bogota Declaration of 3 December 1976 by equatorial countries and to the claims of those countries to exercise sovereign rights over segments of the geostationary-satellite orbit, the claims in question cannot be recognized by this Conference, and that the decisions of this Conference regarding the assignment and use of frequencies and orbital positions in the geostationary orbit are fully in accordance with the International Telecommunication Convention (Malaga-Torremolinos, 1973) by which this Conference is bound.
>
> "The above-mentioned delegations also wish to state that Resolution BP, in referring to the 'relevant technical aspects concerning the special geographical situation of particular countries', does not imply a recognition of claims to any preferential rights to the geostationary orbit."

E. Cuba submitted a statement for Final Protocol (No. 9) directed against the United States, as follows:

> "Signature and acceptance of the Final Acts of the World Administrative Radio Conference, Geneva, 1979, by the Government of the Republic of Cuba does not in any way signify recognition of notification, registration and use of frequencies by the Government of the United States of America in the Cuban territory of the Province of Guantanamo which is being occupied illegally and against the wishes of the Cuban people.
>
> "The use of radio frequencies by the Government of the United States in the territory which it has usurped in Guantanamo, Cuba, constitutes an impediment to the communication services of Cuba and to the exercise of our country's sovereignty over the radio frequency spectrum, which is a limited resource.
>
> "The Government of Cuba reserves the right to take all the necessary steps to safeguard its legitimate interests."

The United States countered with the following short statement (Protocol No. 72):

> "With reference to statement No. 9 by the Government of the Republic of Cuba, the Government of the United States of America notes that the United States presence in Guantanamo is by virtue of a treaty in force; the United States reserves the right to meet its radiocommunication requirements there as heretofore."

F. The remaining initial statements covered a wide variety of issues; however, the largest category (twenty-two) contained a general statement that the administration(s) would do whatever is necessary to protect its interests. Other reservations of particular interest are as follows:

1. Insufficient increase in allocations to HF Broadcasting Service — in addition to the seven countries in the joint statement with the U.S., fourteen other administrations took a reservation on this matter. Several extended their dissatisfaction to include the maritime HF allocations;

2. Intention to continue HF Fixed Service in the bands reallocated to broadcasting and maritime -- ten countries submitted a statement along this line, all but one of which are in Latin America or the Soviet Union bloc;

3. Canada — took a separate reservation on the use of mobile satellite under Footnote 308A in the band 235-399.9 MHz and on the insufficient increase for HF broadcasting at 7 MHz; and finally,

4. Air-ground public telephone service -- ten European countries reserved their right to use channels in the band 862-960 MHz for this operation.

G. Counter-reservations were almost entirely of the general type, stating that in view of the reservations filed, the administration would take whatever steps are necessary to protect its interests. However, three countries mentioned the U.S. reservations specifically in their counter-statement. Kenya took exception to our Nos. 32, 36 and 38, Iran to Nos. 32 and 38, and Cuba to Nos. 36 and 38.

XIII. FORM OF RESULTS AND ENTRY INTO FORCE

A. The Final Acts adopted by the 1979 WARC constitute the "Radio Regulations, Geneva, 1979", which completely replace the provisions of the Radio Regulations, Geneva, 1959, as partially revised by the Administrative Radio Conferences held in 1963, 1966, 1967, 1971, 1974 and 1978. The provisions and associated plan adopted by the 1977 WARC for the Planning of the Broadcast Satellite Service in the 12 GHz Band are included in an appropriate manner and without affecting their content and integrity, and form an integral part of the 1979 Radio Regulations. The Conference authorized the Secretary General to make the necessary final numbering of chapters, articles, sections, sub-sections, paragraphs, sub-paragraphs and marginal numbering, the final numbering of the Appendices, and the consequential cross-references thereto, with regard to the 1979 Radio Regulations, of which certified true copies should be sent by him to the Members of the Union. Members are to inform the Secretary General of their approval (ratification); and the Secretary General will in turn promptly inform all other Members of the ITU.

B. The Final Acts were signed for the United States by Ambassador Glen O. Robinson, Chairman of the U.S. Delegation, and Mr. Samuel E. Probst, a Vice Chairman of the Delegation. It should be noted that the Additional Radio Regulations which form a separate annex to the Convention will be abrogated. The U.S. has never ratified these administrative Regulations or signed earlier Final Acts relevant to them due to a conflict with domestic law and regulations.

C. The 1979 Radio Regulations shall, in general, enter into force on January 1, 1982 at which time all provisions of the 1959 Radio Regulations, as revised, are abrogated, except as noted below. There are two main elements of the Final Acts which have an earlier date of entry into force, that is, January 1, 1981. These are as follows:

1. Provisions relating to identification of stations - Article N23 and new Appendix CA, at which time old Article 19, except for Nos. 745-747 and the associated appendix, shall be abrogated; and

2. Provisions relating to maritime accounting - Article N62A, at which time Articles 37, 38, 39, 40, and 40A and Appendices 21, 21A and 22 and the Additional Radio Regulations shall be abrogated.

D. One part of the Final Acts has a later date of entry into force, that is, February 1, 1983. This is Appendix 27 containing the Frequency Allotment Plan for the Aeronautical Mobile (R) Service and the directly related provisions. This date of entry into force was adopted by the 1978 Aeronautical WARC and respected by the 1979 Conference. The new Regulations contain a wide variety of other dates applicable to specific provisions, implementation steps, and other required actions. An example of one of the more significant dates is the changeover to the new allocations in the high frequency band, i.e., 1989 for bands above 10 MHz and 1994 for bands below 10 MHz.

XIV. CONCLUSIONS

The Conference was eleven weeks of strenuous work, probably too long in view of the extended absences of key telecommunications officials from their jobs. It was an intensive period of difficult negotiations. Yet it was hardly long enough in view of the large number of proposals that had to be considered and the critical issues to be decided, many of which were extremely complex due to the technical, economic, operational, social and political aspects involved. Before the end of the Conference, nearly 17,000 individual proposals had been handled and more than 900 meetings had been held. It was also a difficult Conference just because of its size, the wide variations in background and experience of the delegates, and the many direct conflicts in basic requirements and objectives of the participating administrations. In spite of all this it was the unanimous conclusion of the delegations and the ITU officials at the end of the Conference that the 1979 WARC was a success. The Secretary General in his closing remarks to the Conference went so far as to describe it as "a brilliant success". Understanding and cooperation leading to consensus and agreement — the traditional ITU working method — resulted in the adoption of new Radio Regulations which will govern the various radio services in the use of the frequency spectrum until at least the end of the century.

The U.S. Delegation fully shares in the view that the WARC was successful in carrying out its objectives. We were impressed by the general absence of political debate and the ultimate satisfactory resolution of most of the technical issues. Despite concerns we may have about a few particular decisions taken by the Conference, we believe that the modified Regulations and Allocation Table will provide a sound technical and regulatory framework for the expansion of communication facilities in the U.S. and abroad in the coming years while maintaining a significant degree of order in use of the spectrum allocations by the many radio services.

The U.S. submitted over 900 proposals, each one important, in varying degrees, to some national, social, economic and/or national security need. Almost all of the specific U.S. objectives were obtained, either in whole or in substantial part. Our four general objectives — to achieve international agreement, to maintain maximum flexibility, to support incremental changes, and to support the role of the ITU (see page 9 of this report) -- were achieved, at least for the immediate future. There will be no immediate or drastic changes in the structure and operation of the U.S. telecommunications system as a result of Conference decisions. In fact, many changes mandated by the Conference will be phased-in over an extended period of time.

In this regard, the Delegation found that the frequency allocations for defense purposes were more vulnerable than others, since military systems typically occupy wide bandwidths in highly desirable parts of the spectrum and they are less understood by developing countries. Defense interests were not seriously harmed by the WARC decisions but they were affected in a number of ways, including two that required the U.S. to submit reservations. Within the United States, satisfaction of future military requirements should be approached with a more flexible attitude with respect to compliance with the Radio Regulations, recognizing that this may entail additional economic and technological costs.

The United States submitted reservations on a small number of Conference decisions that could adversely affect an important national communications requirement. A reservation in this case is a formal statement that we will not be bound by a particular conference decision. However, too much should not be made of these reservations. It will be some time yet before the United States must decide if it will be necessary to follow-through with the various reservations. Although the U.S. previously had taken only one reservation at a WARC, this was an unusual record we could not hope to have maintained. What is noteworthy is that of the hundreds of particular decisions, many of them very significant, only a small handful were unacceptable to us.

A major U.S. objective -- support of the International Telecommunication Union as the international agency capable of providing a useful forum for discussing global telecommunications needs and problems and of carrying out the complex decisions of the Conference -- was fully achieved. Conference decisions affirmed (on a consensus basis in most instances) the importance of close cooperation in this important area of international relations, working through the ITU mechanism. We have reason to be well satisfied with the way in which Conference business was conducted. Although there was initial apprehension about politicization of the Conference -- and there were a few unfortunate political skirmishes -- we think the effectiveness of the ITU as a U.N. Specialized Agency devoted to constructive international cooperation has not been compromised. Indeed, the U.S. has every reason to regard the ITU as an effective body for reaching essential international agreement on the regulation of the radio spectrum.

It is a pleasure to note that the 1979 WARC was not the political forum filled with North-South confrontation that some observers predicted it would be. Technical, economic and operational bases predominated the negotiations with few exceptions. Major ideological debate on such issues as the New World Information Order did not occur. However, while the ITU and the international regulatory scheme came out of the 1979 WARC in good shape, it will be tested again in a series of specialized administrative radio conferences and the upcoming Plenipotentiary Conference. It is still a possibility that the ITU will receive undesirable spillover from other more political forums. There will still be underlying political and economic tensions between developed and developing countries, particularly in the areas of future rights to the frequency spectrum and geostationary orbit and of technical cooperation and assistance. A risk will exist for an impasse in negotiations, and it is possible that some conferences may adjourn without consensus and agreement or that blocs of administrations will refuse to go along with the majority on important issues. It is a fair conclusion that the effectiveness of the ITU and its international Regulations will be threatened again in the upcoming years. It is essential that the objective of all countries, and in particular, the United States, must be international cooperation and agreement arrived at through reasonable compromise by both the developed and developing countries, taking into account the real requirements of all interests involved.

The success of the U.S. in achieving its objectives was due in large part to the substantial preparatory effort carried out in the several years prior to the WARC. Major contributing factors were the well thought out and technically sound proposals that the U.S. submitted to the WARC and the extensive program of international consultations. While there may not be another General WARC or other conference of this magnitude before the end of the century, the several conferences scheduled for the near future will treat issues of vital interest to the United States. One might even view the 1979 WARC and the program of future conferences as one continuous ITU conference, with the former simply being the first session. It can be expected that many of the issues and concerns discussed in 1979 will touch each of the future events. The national and individual experience developed for and strengthened at the 1979 WARC should be fully utilized in the preparations for and negotiations at the upcoming conferences. It is imperative that sufficient resources -- both personnel and budgetary -- be made available to enable the U.S. to continue its successful and leading effort in this very important area of international cooperation and regulation.

The U.S. Delegation believes that the 1979 Radio Regulations should be ratified, notwithstanding the reservations taken in Geneva. In this regard, it may be advantageous to the U.S. to complete the ratification process well ahead of the date of entry into force (January 1, 1982). An early notification to the ITU of our approval may serve as a signal to all countries of our goodwill and determination to abide by the international obligations undertaken during the 1979 Conference.

This Report would not be complete without my expression of personal appreciation to each member of our Delegation and staff for his and her contribution to our team effort. Individually and as a group they displayed a high degree of excellence and competence in carrying out their assigned tasks. The successes were achieved and the difficulties were minimized through their persistence and expertise. The U.S. team performed with the highest distinction;

it was a privilege to have been associated with it. As Chairman I am grateful for the opportunity given me to participate in this Conference. I also appreciate the Department's strong support which was an essential contribution to the success achieved by the U.S. Delegation.

Respectfully yours,

Glen O. Robinson
Chairman
United States Delegation
World Administrative Radio Conference
Geneva, 1979

Annexes:

A - List of Countries and Organizations.

B - United States Delegation; Geneva Support Group; Department of State Public Advisory Committee.

C - List of Working and Ad Hoc Groups.

D - Cross-Reference List of Interim and Final Numbers Used for Major Elements of the Radio Regulations.

Annex A-1

List of Countries and Organizations

I. Countries

Countries	Country Symbol	No. of delegates
Afghanistan (Democratic Republic of)	AFG	3
Albania (Socialist People's Republic of)	ALB	4
Algeria (Algerian Democratic and Popular Republic)	ALG	20
Germany (Federal Republic of)	D	51
Angola (People's Republic of)	AGL	6
Saudi Arabia (Kingdom of)	ARS	25
Argentine Republic	ARG	29
Australia	AUS	25
Austria	AUT	11
Bangladesh (People's Republic of)	BGD	10
Belgium	BEL	18
Benin (People's Republic of)	BEN	8
Byelorussian Soviet Socialist Republic	BLR	2
Bolivia (Republic of)	BOL	3
Botswana (Republic of)	BOT	2
Brazil (Federative Republic of)	B	23
Bulgaria (People's Republic of)	BUL	10
Burundi (Republic of)	BDI	4
Cameroon (United Republic of)	CME	7
Canada	CAN	38
Cape Verde (Republic of)	CPV	3
Central African Republic	CAF	3
Chile	CHL	10
China (People's Republic of)	CHN	28
Cyprus (Republic of)	CYP	8
Vatican City State	CVA	4
Colombia (Republic of)	CLM	21
Congo (People's Republic of the)	COG	5
Korea (Republic of)	KOR	24
Costa Rica	CTR	11
Ivory Coast (Republic of the)	CTI	13
Cuba	CUB	10
Denmark	DNK	18
Djibouti (Republic of)	DJI	3
Dominican Republic	DOM	2
Egypt (Arab Republic of)	EGY	15
El Salvador (Republic of)	SLV	6
United Arab Emirates	UAE	4
Ecuador	EQA	8
Spain	E	34
United States of America	USA	69
Ethiopia	ETH	5
Fiji	FJI	4
Finland	FNL	10

France	F	87
Gabon Republic	GAB	10
Gambia (Republic of the)	GMB	1
Ghana	GHA	2
Greece	GRC	16
Guatemala	GTM	6
Guinea (People's Revolutionary Republic of)	GUI	6
Guinea-Bissau (Republic of)	GNP	2
Guyana	GUB	3
Haiti (Republic of)	HTI	4
Upper Volta (Republic of)	HVO	3
Honduras (Republic of)	HND	4
Hungarian People's Republic	HNG	16
India (Republic of)	IND	15
Indonesia (Republic of)	INS	23
Iran (Islamic Republic of)	IRN	22
Iraq (Republic of)	IRQ	21
Ireland	IRL	9
Iceland	ISL	4
Israel (State of)	ISR	5
Italy	I	43
Jamaica	JMC	5
Japan	J	49
Jordan (Hashemite Kingdom of)	JOR	11
Democratic Kampuchea	CBG	1
Kenya (Republic of)	KEN	16
Kuwait (State of)	KWT	16
Lesotho (Kingdom of)	LSO	4
Lebanon	LBN	7
Liberia (Republic of)	LBR	11
Libya (Socialist People's Libyan Arab Jamahiriya)	LBY	5
Liechtenstein (Principality of)	LIE	2
Luxembourg	LUX	6
Madagascar (Democratic Republic of)	MDG	6
Malaysia	MLA	14
Malawi	MWI	6
Maldives (Republic of)	MLD	3
Mali (Republic of)	MLI	7
Malta (Republic of)	MLT	7
Morocco (Kingdom of)	MRC	14
Mauritius	MAU	1
Mauritania (Islamic Republic of)	MTN	1
Mexico	MEX	17
Monaco	MCO	3
Mongolian People's Republic	MNG	3
Mozambique (People's Republic of)	MOZ	2
Nauru (Republic of)	NRU	1
Nepal	NPL	2

Nicaragua	NCG	1
Niger (Republic of the)	NGR	3
Nigeria (Federal Republic of)	NIG	25
Norway	NOR	20
New Zealand	NZL	13
Oman (Sultanate of)	OMA	9
Uganda (Republic of)	UGA	3
Pakistan (Islamic Republic of)	PAK	4
Panama (Republic of)	PNR	4
Papua New Guinea	PNG	9
Paraguay (Republic of)	PRG	3
Netherlands (Kingdom of the)	HOL	31
Peru	PRU	5
Philippines (Republic of the)	PHL	14
Poland (People's Republic of)	POL	20
Portugal	POR	14
Qatar (State of)	QAT	16
Syrian Arab Republic	SYR	12
German Democratic Republic	DDR	14
Democratic People's Republic of Korea	KRE	12
Ukrainian Soviet Socialist Republic	UKR	2
Roumania (Socialist Republic of)	ROU	7
United Kingdom of Great Britain and Northern Ireland	G	48
Rwanda (Republic of)	RRW	3
San Marino (Republic of)	SMR	6
Senegal (Republic of the)	SEN	10
Sierra Leone	SRL	4
Singapore (Republic of)	SNG	5
Somali Democratic Republic	SOM	7
Sudan (Democratic Republic of the)	SDN	5
Sri Lanka (Democratic Socialist Republic of)	CLN	3
Sweden	S	26
Switzerland (Confederation of)	SUI	16
Swaziland (Kingdom of)	SWZ	2
Tanzania (United Republic of)	TGK	4
Chad (Republic of the)	TCD	2
Czechoslovak Socialist Republic	TCH	6
Thailand	THA	10
Togolese Republic	TGO	8
Trinidad and Tobago	TRD	1
Tunisia	TUN	23
Turkey	TUR	10
Union of Soviet Socialist Republics	URS	33
Uruguay (Oriental Republic of)	URG	12
Venezuela (Republic of)	VEN	21
Yemen Arab Republic	YEM	4
Yemen (People's Democratic Republic of)	YMS	2
Yugoslavia (Socialist Federal Republic of)	YUG	28
Zaire (Republic of)	ZAI	6
Zambia (Republic of	ZMB	4

II. Recognized Private Operating Agencies

The Marconi International Marine Company Ltd.

III. United Nations and Specialized Agencies

United Nations
United Nations Educational, Scientific and Cultural Organization (UNESCO)
World Health Organization (WHO)
International Civil Aviation Organization (ICAO)
World Meteorological Organization (WMO)
Intergovernmental Maritime Consultative Organization (IMCO)

IV. Regional Organizations (Art. 32 of Convention)

African Postal and Telecommunications Union (APTU)
Arab Telecommunication Union (ATU)
Pan-African Telecommunication Union (PATU)

V. Other International Organizations

Agency for Safety of Air Navigation in Africa and Madagascar (ASECNA)
European Space Agency (ESA)
North American National Broadcasters Association (NANBA)
International Air Transport Association (IATA)
Inter-American Association of Broadcasters (IAAB)
International Association of Lighthouse Authorities (IALA)
World Association for Christian Communication (WACC)
Intergovernmental Bureau for Informatics (IBI)
International Chamber of Shipping (ICS)
International Committee of the Red Cross (ICRC)
International Maritime Radio Association (CIRM)
International Special Committee on Radio Interference (CISPR)
Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)
International Electrotechnical Commission (IEC)
International Transport Workers Federation (ITF)
Arab Satellite Communications Organization (ARABSAT)
International Criminal Police Organization (INTERPOL)
International Radio and Television Organization (OIRT)
International Telecommunications Satellite Organization (INTELSAT)
International Space Telecommunication Organization (INTERSPUTNIK)
Asia-Pacific Broadcasting Union (ABU)
Arab States Broadcasting Union (ASBU)
Union of National Radio and Television Organizations of Africa (URTNA)
European Broadcasting Union (EBU)
International Amateur Radio Union (IARU)
International Union of Radio Science (URSI)

VI. Permanent Organs of the Union

General Secretariat
International Frequency Registration Board (IFRB)
International Radio Consultative Committee (CCIR)
International Telegraph and Telephone Consultative Committee (CCITT)

Annex B-1

United States Delegation
to the
World Administrative Radio Conference
(Geneva, September 24 - December 6, 1979)

I. United States Delegation (see Note)

Chairman:	Ambassador Glen O. Robinson
Vice Chairmen:	Mr. Wilson Dizard Office of International Communications Policy Department of State
	Mr. Samuel E. Probst Deputy Associate Administrator, Spectrum Management National Telecommunications and Information Administration Department of Commerce
	Mr. Kalmann Schaefer Foreign Affairs Adviser Office of Plans and Policy Federal Communications Commission
	Mr. Richard E. Shrum Office of International Communications Policy Department of State
	Mr. William R. Torak International and Operations Division Federal Communications Commission
	Mr. Francis S. Urbany Manager, International Communications National Telecommunications and Information Administration Department of Commerce

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Note: An asterisk (*) indicates delegate who attended the Conference on a part-time basis. Ambassador William vanden Heuvel, U.S. Mission to the European Office of the United Nations and Other International Organizations, Geneva, was accredited in advance as a Senior Adviser but was unable to attend the Conference due to reassignment; therefore, his name does not appear in the final List of Participants of the 1979 WARC or in this Annex.

Congressional Advisers:

*The Honorable Wyche Fowler, Jr.
House of Representatives

*The Honorable Charles Rose
House of Representatives

Delegates:

Mr. Perry G. Ackerman
Manager, Systems Engineering Laboratory
Hughes Aircraft Company
Los Angeles, California

Mrs. Ann Aldrich
Professor of Law
Cleveland State University Law School
Cleveland, Ohio

Mr. Dexter Anderson
Telecommunications Attache
United States Mission
Geneva, Switzerland

Mr. George Bartlett
Vice President for Engineering
National Association of Broadcasters
Washington, D. C.

*Mr. Herbert T. Blaker
Manager, Communications/Regulatory Policy
Rockwell International
Arlington, Virginia

Mr. William Borman
Director of Technical Programs
Motorola, Inc.
Washington, D. C.

Mr. Nolan Bowie
Executive Director
Citizens Communication Center
Washington, D. C.

Mr. Lewis Bradley
Spectrum Management Division
National Telecommunications and
Information Administration
Department of Commerce

Mr. Charles Breig
Broadcast Bureau
Federal Communications Commission

Mr. Paul E. Carroll
International and Operations Division
Federal Communications Commission

Mrs. Anna L. Case
Chief of the Frequency Division
Voice of America
International Communication Agency

Mr. William J. Cook
Assistant to the Assistant Secretary
of Defense (CCCI)
Department of Defense

Mr. Anthony M. Corrado
Vice Chairman
Interdepartment Radio Advisory Committee
National Telecommunications and
Information Administration
Department of Commerce

Mr. Robert L. Cutts
Chief, International and Operations
Division
Federal Communications Commission

Dr. Satyendranath Das
International Conference Staff
Federal Communications Commission

Mr. Charles Dorian
Director, Technical Planning
ComSat General Corporation
Washington, D. C.

Mr. A. James Ebel
Chairman of the Satellite Transmission
Committee
ABC, CBS and NBC Network Affiliates
Association
Lincoln, Nebraska

Mr. Harry A. Feigleson
Director, Electromagnetic Spectrum
Management
Department of the Navy

Mr. John Gilsenan
Private Radio Bureau
Federal Communications Commission

Mr. E. Merle Glunt
Consultant
American Radio Relay League
Mount Union, Pennsylvania

Mr. Robert E. Greenquist
Assistant Vice President for
Technical Policy and Standards
Western Union Telegraph Company
Upper Saddle River, New Jersey

Mr. Wendell Harris
Common Carrier Bureau
Federal Communications Commission

Mr. Melvin L. Harrison
Office of International Communications
Policy
Department of State

Mr. Earl J. Holliman
Chief, Frequency Management Staff
U.S. Coast Guard

Mr. David Honig
Assistant Professor
Department of Radio and Television
School of Communications
Howard University
Washington, D. C.

Miss Karyl A. Irion
Systems Analyst
Systematics General Corporation
Falls Church, Virginia

*Mr. Eugene Jackson
President
National Black Network
New York, New York

*Mr. George Jacobs
Director, Research and Engineering
Board for International Broadcasting

Mr. Edward Jacobs
Chief, International Conference Staff
Federal Communications Commission

*Mr. Donald Jansky
Associate Administrator
National Telecommunications and
Information Administration
Department of Commerce

Mr. Raymond Johnson
Chief, Spectrum Management Staff
Federal Aviation Administration

Colonel Wayne Kay
Office of Science and Technology Policy
The White House

Mr. John J. Kelleher
Vice President
Systematics General Corporation
National Scientific Laboratories
Falls Church, Virginia

Mr. John W. Kiebler
Engineer
National Aeronautics and Space
Administration

Mr. Harold Kimball
Chief, Communications and Frequency
Management
National Aeronautics and Space
Administration

*Mr. Stanley Leinwoll
Director of Engineering
Radio Free Europe
New York, New York

Mr. Ronald J. Lepkowski
Common Carrier Bureau
Federal Communications Commission

*Dr. Stephen J. Lukasik
Chief Scientist
Federal Communications Commission

Mr. William A. Luther
Chief, Engineering Division
Field Operations Bureau
Federal Communications Commission

Mr. Robert May
Frequency Management Office
U.S. Air Force

Mr. Robert Mayher
Deputy Chief, Spectrum Engineering
and Analysis Division
National Telecommunications and
Information Administration
Department of Commerce
Annapolis, Maryland

Mr. Vernon McConnell
Military Communication Electronics Board
Department of Defense

Mr. James C. McKinney
Deputy Chief
Field Operations Bureau
Federal Communications Commission

Mr. Neal McNaughten
Assistant Chief, Broadcast Bureau
Federal Communications Commission

Mr. Robert P. Moore
Office of the Chief of Naval
Operations, R&D Plans Division
Department of the Navy

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NOTE: The following two persons were invited to participate in the Advisory Committee but were unable to because of the press of other business: Ms. Florine Koole, Assistant Vice President, Communications Workers of America, Omaha, Nebraska, and Mr. Val Williams, President and General Manager, National Association of Business and Educational Radio, Inc., Washington, D. C.

Annex C-1

List of Working and Ad Hoc Groups

Group	Terms of Reference (Chairman and U.S. Spokesman)
	Committee 1 - none
	Committee 2
2A	To examine credentials of various administrations (Chairman: Martinez (VEN); U.S. - none)
	Committee 3 - none
	Committee 4
4/ad hoc 1	To develop forms for the expression of peak envelope power, mean power and carrier power (Chairman: Mayher (USA); U.S. - none)
4A	Consideration of proposals relating to Article N1 (Sections V and VI) and Article N2 (Chairman: Bastikar (CAN); U.S. - Mayher)
4A1	To perform drafting with regard to definitions for satellites (Chairman: West (G); U.S. - Tycz)
4A2	To resolve definitions of "emission" and "radiation" (Chairman: Davies (AUS); U.S. - Parlow)
4A3	To resolve definitions required for "out-of-band emission", "out-of-band spectrum" and "spurious emission" (Chairman: Mayher (USA); U.S. - Tycz)
4A4	To determine technically correct definitions of "harmful interference", "permissible interference", "accepted interference" and "tolerable interference" (Chairman: Railton (PNG); U.S. - Parlow)
4A5	To consider definition of "protection ratio" (Chairman: Dwyer (AUS); U.S. - Mayher)
4A6	To define "channel", "frequency band", and, if necessary, interpret the meaning of "in the same band" from Doc. 279 (Chairman: Tycz (USA); U.S. - none)
4A7	To consider the table of frequency designators (LF, MF, etc.) Chairman: unknown; U.S. - Mayher)

4A8	To consider power terms: power, peak envelope power of a radio transmitter, mean power of a radio transmitter, carrier power of a radio transmitter (Chairman: Aka (CTI); U.S. - Tycz)
4A9	To consolidate all antenna gain definitions into one group (Chairman: Dwyer (AUS); U.S. - Mayher)
4A10	To consider definitions of coverage area and service area (Chairman: Groschel (D); U.S. - Breig)
4A11	To consider mobile earth station coordination distance, contours (Chairman: Railton (PNG); U.S. - Phillips)
4B	Consideration of proposals relating to sharing criteria between Space Systems and between Space and Terrestrial Systems: Articles N25, 26, 27 and 27A. Appendices 28, 28A, 28B, 29. Appendices 1A and 1B in connection with Committee 6 (Chairman: Craig (AUS); U.S. - Weiss)
4B1	Drafting group to deal with AUS and URS proposals on RR 6003 and RR 6004 (Chairman: Amero (CAN); U.S. - Weppler)
4B2	Consideration of: Format of Appendix 28, SPM Output, Relevant CCIR Reports, Proposals by administrations, Comments by the IFRB, and Comments made in 4B on October 4 (Chairman: Weiss (USA); U.S. - Lepkowski)
4B3	Consideration of Appendix 29 excluding discussion of $\Delta t/t$ percentages in excess of 3% and discrimination TV/SCPC issue can be discussed (Chairman: Payet (F); U.S. - Weiss)
4B4	To consider sharing between ISS and Radionav and to establish pfd's on ISS in the range 20-40 GHz (Chairman: Bolingbroke (G); U.S. - Weiss)
4B5	Drafting group to deal with RR 6108, 6109, 6110 (Station keeping of space stations) (Chairman: Amero (CAN); U.S. - Greenquist)
4B6	Drafting group to deal with RR provisions for Radio Astronomy observations in the shielded zone of the Moon (Chairman: Dubinski (URS); U.S. - Pankonin)
4B7	To consider technical aspects of F/82/816 - F/82/821 re proposed Article N27A (BcSat uplinks) (Chairman: Willenberg (D); U.S. - Breig)

4B8	To consider the wording in Appendix 29 concerning assigned frequency bands and overlapping bands (Chairman: Brooks (IFRB); U.S. - Weiss)
4C	Consideration of proposals relating to Technical Provisions: Articles N3, 4, 16, 17, 33 (section IV B) and Appendices 3, 4, 5, A and B (Chairman: George (D); U.S. - Luther)
4C1	To consider proposals concerning Article N4, RR3244 relating to Technical Characteristics (Chairman: Bedington (CAN); U.S. - Luther)
4C2	To consider ALG/119/42, SLV/26/87 and DL-24 relating to RR 5001, Interference (Chairman: Visin (I); U.S. - Luther)
4C3	Drafting group to prepare consolidated language with terms of reference of bandwidth description, a consolidated Appendix B and Appendix 5, not to include additional characteristics, footnote referring to additional or up-to-date examples in CCIR texts (Chairman: Deveraux (G); U.S. - Luther)
4C4	To consolidate App. 5 and App. B and to develop a final list of necessary bandwidth examples, to include the additional characteristics of CCIR Rec. 507 for designation of emissions (Chairman: Langer (D); U.S. - Luther)
4C5	To consider spurious limits above 1 GHz -- should they exist, and, if so, what should they be? (Chairman: Railton (PNG); U.S. - Luther)
4R	(Editorial) To perfect the form of the provisions of the Radio Regulations revised and approved by the Working Groups of the Committee, without altering the sense (Chairman: Domingues (E); U.S. - none)

Committee 5

5/ad hoc 1	Study of Regions (Chairman: Lediju (NIG); U.S. - none)
5/ad hoc 2	Study of the organization of Working Group 5B (Chairman: Harbi (ALG); U.S. - none)
5/ad hoc 3	ISM applications (Chairman: Berthod (F); U.S. - McKinney)
5/ad hoc 4	High frequency broadcasting (Chairman: Huet (F); U.S. - G. Jacobs)

5/ad hoc 5	Consideration of proposals relating to the terms "active sensor" and "passive sensor" (Chairman: Quintas (E); U.S. - Williams)
5/ad hoc 6	Earth exploration-satellite service (space-to-Earth) in the band 8,025 - 8,400 MHz; sharing between the inter-satellite service and the radionavigation service in the band 32 - 33 GHz (Chairman: Kimball (USA); U.S. - none)
5/ad hoc 7	Draft Resolution concerning tropospheric scatter (Chairman: Tapiador (E); U.S. - none)
5/ad hoc 8	Problems of frequency sharing in the 12 GHz region between the fixed-satellite and the broadcasting-satellite services (between Regions 1 and 2 and Regions 1 and 3 and possible solutions) (Chairman: Phillips (G); U.S. - Shrum)
5/ad hoc 9	Frequency sharing between active and passive service in 10.6 - 10.8 GHz and 18.6 - 18.8 GHz bands (Chairman: Cisee (SEN); U.S. - Kimball)
5/ad hoc 10	Choice of the frequency bands to be used by the feeder links for the broadcasting-satellite service (Chairman: Ahmed (SDN); U.S. - Torak)
5/ad hoc 11	Use of the 3.4 - 3.6 GHz and 4.5 - 4.8 GHz bands by the fixed-satellite service (space-to-Earth) for national and sub-regional coverage) (Chairman: Subaran (JMC); U.S. - Torak)
5A	Review and if necessary revise all provisions associated with the Table of Frequency Allocations (Articles N1, N5, N6, N8, N28 (Sec. I), N29, N33A, N47) (Chairman: Quintas Castans (E); U.S. - Glunt)
5A1	Standard texts of footnotes on radio astronomy (Chairman: Horner (G); U.S. - McKinney)
5A2	Aeronautical Mobile Service (Chairman: Mueller (D); U.S. - Williams)
5A3	Consideration of proposals submitted in relation to the terms assignment, allotment and allocation (Chairman: Bletterie (F); U.S. - Glunt)
5BA	Review and if necessary revise the Table of Frequency Allocations in the bands below 4,000 kHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Cook (VEN); U.S. - Feigleson)

5BA1	Allocations in bands 130 - 490 kHz in Region 1 (Chairman: Lundberg (S); U.S. - none)
5BA2	Resolution 500 kHz guardband (Chairman: Benchemam (ALG); U.S. - Holliman)
5BA3	Allocations in bands 525 - 2,000 kHz in Region 2 (Chairman: Fernandez (CUB); U.S. - Feigleson)
5BA4	Allocation of frequency band 1,800 - 2,000 kHz in Region 3 (Chairman: Zamanian (IRN); U.S. - Glunt)
5BA5	Designation of a frequency in the bands 415 - 490 kHz or 510 - 525 kHz for transmission of distress, urgency and safety information to ships (Chairman: Vedder (HOL); U.S. - Holliman)
5BA6	Guardband frequency 2,170 - 2,194 kHz (Chairman: Hewitt (CAN); U.S. - Holliman)
5BA7	Recommendation relating to the preparation of a broadcasting plan in the band 1,605 - 1,705 kHz in Region 2 (Chairman: Chau (CAN); U.S. - Palmer)
5BA8	Allocation of Radiolocation Service in the bands 3,200 - 3,700 kHz (Chairman: Laurent (F); U.S. - none)
5BA9	Frequency bands for natural disaster (Chairman: Kieffer (SUI); U.S. - Glunt)
5BA10	Provisions for the use of the bands 1,625 - 1,635 kHz, 1,800 - 1,810 kHz and 2,160 - 2,170 kHz in Region 1 by the radiolocation service (Chairman: Watson (MWI); U.S. - none)
5BA11	Amend draft Recommendation in Document No. 513 (see 5BA7) (Chairman: Davies (AUS); U.S. - none)
5BA12	Planning for the use of the bands between 435 - 526.5 kHz and 1,606.5 - 2,400 kHz by the maritime mobile service in Region 1 (Chairman: Erikson (S); U.S. - Palmer)
5BA13	Use of LF bands shared between the broadcasting service and the aeronautical radionavigation service (Chairman: Longman (CAN); U.S. - Palmer)
5BA14	Modification of carrier frequencies of LF broadcasting stations in Region 1 (Chairman: Huet (F); U.S. - none)

5BB	Review and if necessary revise the Table of Frequency Allocations in the bands between 4 and 27.5 MHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Barnes (AUS); U.S. - Feigleson)
5BA/5BB ad hoc	Analysis of Resolutions and Recommendations assigned to Working Groups 5BA and 5BB (ARG/PNG only)
5C	Review and if necessary revise the Table of Frequency Allocations in the bands between 27.5 MHz and 960 MHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Olms (D); U.S. - Gilsenan)
5C/ad hoc	Consideration of proposals concerning bands between 47 and 68 MHz (Region 1) and between 87.5 and 108 MHz (Regions 1 and 3) (Chairman: Schwarz (SUI); U.S. - van Doorn)
5D	Review and if necessary revise the Table of Frequency Allocations in the bands between 960 MHz and 40 GHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Rao (IND); U.S. - E. Jacobs)
5D1	Fixed-satellite service and broadcasting-satellite feeder links (Chairman: Withers (G); U.S. - Lepkowski)
5D2	Drafting of footnote MOD 3713/361 (D/F/SUI; U.S. - E. Jacobs)
5D3	Draft Resolution on study by the CCIR of choice of suitable frequency, effect on other radio services and on the ionosphere of the transmission of power by wireless (Proposal USA/45/145) (Chairman: Carter (G); U.S. - Kimball)
5D4	Combined proposals on footnote 3730/367B (Chairman: Holliman (USA); U.S. - none)
5D5	Preparation of possible footnotes applicable to allocations in the frequency band 960 MHZ - 40 GHz for radio astronomy service and ISM applications (Chairman: Whiteoak (AUS); U.S. - Pankonin)
5D6	Proposals relating to the bands between 1,535 and 1,660 MHz (Chairman: Dorian (USA); U.S. - E. Jacobs)
5D7	Satellite sound broadcasting in the band 960 MHz - 2 GHz (Chairman: Dito (HOL); U.S. - E. Jacobs)

5D8	Summarized proposal for fixed-satellite service (space-to-Earth) allocation in the bands 3.4 - 3.7 GHz and 4.5 - 4.8 GHz and footnotes and Resolution (Chairman: Ogle (USA); U.S. - Torak)
5D9	Summarized proposal for fixed-satellite service (Earth-to-space) allocation in the band 10 - 20 GHz (Chairman: Ahmed (SDN); U.S. - E. Jacobs)
5D10	Drafting of footnote ADD 3782A (Chairman: Holliman (USA); U.S. - none)
5D11	Earth exploration and space research services in the bands 10.6 - 10.7 GHz (Chairman: Doherty (CAN); U.S. - Kimball)
5D12	Summarized proposals of delegations of AUS and USA and proposals contained in Document No. DL/146 (Chairman: Houssin (F); U.S. - Dorian)
5D13	Summarized proposals relating to footnotes 3705/356AB, 3706/356ABA and 3707/356AC and drafting of modified texts (Chairman: Alumbreros (E); U.S. - Kimball)
5D14	To formulate the text of a footnote which is applicable in the exclusive passive bands (Chairman: Greco (I); U.S. - E. Jacobs)
5D15	To formulate the text of a footnote in connection with the allocation of the band 12.2 - 12.5 GHz to the broadcasting-satellite service and fixed-satellite services in Region 3 (Chairman: Pike (AUS); U.S. - Reinhart)
5D16	Proposals concerning allocations in the 12 GHz band (Chairman: Pike (AUS); U.S. - Shrum)
Region 2 ad hoc	Preparation of texts relating to the allocation of the 11.7 - 12.7 GHz band in Region 2 as well as the relevant Resolutions (Chairman: Martinez (VEN); U.S. - Shrum)
5E	Review and if necessary revise the Table of Frequency Allocations in the bands above 40 GHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Adey (CAN); U.S. - Moore)
5E1	Consideration of proposals concerning passive services at frequencies above 275 GHz (Chairman: Whiteoak (AUS); U.S. - Moore)

5E2	Consideration of allocations to space services in the bands 40 - 52 GHz and of recommendations to be made to Working Group 5B for bands 36 - 40 GHz (Chairman: Moore (USA); U.S. - May)
5E3	Consideration of proposals concerning allocations of frequencies in the band 52 - 84 GHz (Chairman: Olsen (CAN); U.S. - Moore)
5E4	Consideration of proposals relating to allocations of frequencies in the bands 84 - 105 GHz (Chairman: Schult (D); U.S. - Moore)
5E5	Consideration of proposals relating to allocations of frequencies in the bands 105 - 152 GHz (Chairman: Stemp (G); U.S. - Moore)
5E6	Consideration of proposals relating to allocations of frequencies between 152 - 230 GHz (Chairman: Muratani (J); U.S. - Moore)
5E7	Consideration of proposals relating to allocations of frequencies between 217 - 275 GHz (Chairman: Das (USA); U.S. - Moore)
5E8	Consideration of proposals relating to allocations in the bands above 275 GHz (Chairman: Bourgeat (F); U.S. - Moore)
5R	(Editorial) To perfect the form of the texts to be considered by Committee 5 without altering the sense (Chairman: Piponnier (F); U.S. - none)

Committee 6

6/ad hoc 1	To consider the UK proposal in Doc. 358 regarding the application of CCIR Recommendations referred to in the Regulations (Chairman: Larsen (DNK); U.S. - Corrado)
6/ad hoc 2	To examine all proposals related to the use of the geostationary orbit and to the planning of space services utilizing it. To give consideration to: the desirability, feasibility and the possibility of planning of space services the services and frequency bands which might be considered within the framework of this planning the preparatory work that would have to be carried out before any planning conference, including development of the principles and necessary technical bases the desirability, feasibility and possibility of other approaches supplemental to the existing provisions of Articles N11 and N13.

	To prepare, if necessary, the texts to be proposed for adoption by WARC 1979 (Chairman: Wilkinson (AUS); U.S. - Urbany)
6/ad hoc 3	To consider items concerning a transition procedure at HF and related Notification procedures (Chairman: Bjornsjo (S); U.S. - Corrado)
6/ad hoc 4	To consider a proposal of France relating to the procedure for the transfer of ICPO Interpol frequency assignments in MF bands; To consider a proposal of the USA relating to revision of Res. No. Spa2-6 (Chairman: Deodhar (IND); U.S. - Kelleher)
6A	To examine the proposals relating to the coordination, notification and registration of frequency assignments (Articles N11, N12, N13) and proposals relating to new procedures connected with these Articles; Appendices 1, 1A and 1B; the appropriate Resolutions (including Resolution No. Spa2-3) and Recommendations (Chairman: Bjornsjo (S); U.S. - Kelleher)
6A/ad hoc 1	To align Art. N12 with the principles in Doc. 488 concerning the HF fixed service and to examine appropriate Resolutions (Chairman: Bouhired (ALG); U.S. - Urbany)
6A/ad hoc 2	To develop a Resolution concerning assistance to the developing countries in frequency management (Chairman: Kaba (HVO); U.S. - Carroll)
6A1	Drafting group to develop wording of the Regulations relating to the work of 6A1 (Chairman: Bjornsjo (S); U.S. - Kelleher)
6A2	To consider existing Resolutions and Recommendations; to examine and develop Resolutions concerning assistance in the use of computers (Chairman: Lewis (AUS); U.S. - Kelleher)
6A3	To consider proposed changes to Appendices 1, 1A, 1B and 9 (Chairman: Corrado (USA); U.S. - Lepkowski)
6A4	To consider principles for regulatory procedures relative to the HF band and consequential amendments to Article N12/9 (Chairman: Bouhired (ALG); U.S. - Urbany)

6B	To examine the proposals relating to the activities of the IFRB (Articles N9 and N10); the provisions adopted against harmful interference in the N20 (Procedure in a case of Harmful Interference) and the corresponding Appendices 6, 7 and 8; the amendments to be made to Appendix 9 (List I) resulting from the decisions on Articles N11, N12 and N13 and Appendices 1, 1A and 1B; the Resolutions and Recommendations other than those relating to procedures connected with Articles N11, N12 and N13 (Chairman: Garcia de Davis (CTR); U.S. - Corrado)
6B1	To consider proposals for the Radio Regulations Nos. 3953, 3953A, 3960A and 3960A.1 (Chairman: Binz (D); U.S. - Corrado)
6B2	To consider proposals for the Appendices 6, 7 and 8 (Chairman: Corrado (USA); U.S. - none)
6R	(Editorial) To improve the drafting of the provisions of the Radio Regulations revised and approved by the Working Groups of Committee 6, without changing the sense (Chairman: Garidou (F); U.S. - none)

Committee 7

7/ad hoc 1	(not used)
7/ad hoc 2	To consider all proposals concerning Res. No. Sat 4 relating to the annexing to the Radio Regulations of the provisions and associated Plan contained in the Final Acts of the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977 (Chairman: Utsumi (J); U.S. - Shrum)
7/ad hoc 3	To reach consensus on an Argentina proposal for a WARC Recommendation that the ITU Secretariat develop with Administrations a "draft" conference structure, including proposed committee structure, approximately one year ahead of an Administrative Radio Conference so that smaller countries, particularly developing countries, could plan delegation size and conference participation in the right proportion (Chairman: Otero (ARG); U.S. - none)
7/ad hoc 4	To consider the contents of Doc. No. 625, to which were annexed texts of proposed additional provisions in Articles N11, N12 and N13 relating to the responsibility for frequency notifications and to cases of disputed sovereignties, and Doc. No. DL/226 containing a proposal from Morocco for a preamble to the Radio Regulations on this subject (Chairman: Fulton (G); U.S. - Schaefer)

7/ad hoc 5	To develop a possible schedule for future Radio Conferences and to treat associated Resolutions (Chairman: Ducharme (CAN); U.S. - McKinney)
7/ad hoc 6	To consider proposals concerning Service Documents: Article N24/20, Appendices 9, 10, 10A and 11, Resolution No. Mar2-17 (Chairman: Schenke (D); U.S. - Luther)
7/ad hoc 7	To consider proposals for Article N23 (Identification of Stations) and associated appendices except new Appendic C (Chairman: Railton (PNG); U.S. - McKinney)
7/ad hoc 8	To review and, if necessary, revise a draft Recommendation concerning the optimization of the use of frequencies in parts of the VHF and UHF spectrum by introducing bandwidth-saving techniques for the transmission of television signals (Chairman: DeZwart (HOL); U.S. - Breig)
7A	To study the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions (Chairman: Foggon (AUS); U.S. - McKinney)
7A1	Drafting group concerning language for provisions for medical transports (Chairman: McKinney (USA); U.S. - none)
7B	Drafting group to consider Definitions in Section 1 of Article N1 (Chairman: Witham (G); U.S. - Williams)
7R	(Editorial) To improve the drafting of the provisions of the Radio Regulations revised and approved by Committee 7, without changing the sense (Chairman: Bisner (F); U.S. - none)

Committee 8

8/ad hoc 1	To consider proposals relating to the Re-arrangements of the Radio Regulations as they affect Chapters NXI and NXII (Chairman: Fulton (G); U.S. - Anderson)
8/ad hoc 2	To consider proposals relating to the Re-arrangements of the Radio Regulations as they affect Chapter NIXA (Priority of communications in the mobile services, public correspondence in the maritime mobile service) Chairman: Fulton (G); U.S. - Harrison)

Committee 9

9/ad hoc 1	To treat texts concerning Definitions (Article N1) (Chairman: Bletterie (F); U.S. - Aldrich)
9/ad hoc 2	To review miscellaneous Recommendations and Resolutions from Committee 4 (Chairman: various (F); U.S. - Aldrich)

Plenary

PL/ad hoc 1	To prepare Appendix 28 for Plenary consideration; to do calculations shown in Tables 1 and 2 based upon Plenary-approved Table of Frequency Allocations (Art. N7/5) (Chairman: Craig (AUS); U.S. - Parlow)
PL/ad hoc 2	To consider Doc. No. 576, a Syrian draft resolution relating to operations in HF broadcasting (Chairman: Chabsigh (SYR); U.S. - Luther)
PL/ad hoc 3	To review a draft recommendation relating to the standardization of the technical and operational characteristics of radio equipment (Chairman: Malumbe (KEN); U.S. - Breig)
PL/ad hoc 4	To consider the texts developed by various Committees regarding provisions concerning services in the bands allocated to the broadcasting-satellite service at 12 GHz (Article N13B and Resolutions Nos. BB, CC, DD, EE) (Chairman: Carter (G); U.S. - Shrum)

Annex D-1

Cross-Reference List of Interim and Final Numbers Used for Major Elements of the Radio Regulations

Articles of the Radio Regulations (Chapter/Interim Article Number/Final Number)

Part A

I	N1	1		N23	25		N47	50
	N2	2	VII	N24	26		N48	51
	N2A	3	VIII	Part B N25	27		N49	52
	N3	4		N26	28		N50	53
II	N4	5		N27	29	XI	N51	54
III	N5	6		N28	30		N52	55
	N6	7		N29	31		N53	56
	N7	8		N30	32		N54	57
	N8	9		N31	33		N55	58
IV	N9	10		N32	34		N56	59
	N10	SUP		N33	35		N57	60
	N11	11		N33A	36		N58	61
	N12	12	IX	N34	37		N59	62
	N13	13		N35	38		N60	63
	N13A	14		N36	39		N61	64
	N13B	15		N37	40		N62	65
	N14	16		N38	41		N62A	66
	N15	17		N39	42		N63	SUP
V	N16	18	X	N40	43		N64	SUP
	N17	19		N41	44	XII	N65	67
	N18	20		N42	45		N66	SUP
	N19	21		N43	46		N67	SUP
	N20	22		N44	47		N68	68
VI	N21	23		N45	48		N69-N72 + ARR	SUP
	N22	24		N46	49			
						XIII	N73	69

Appendices

(Interim Number/Final Number)

1	1
1A	3
1B	4
1C	5
2	2
3	7
4	8
5	6
6	21
7	22
8	23
9	9
10	10
11	11
12	12
13	13
13A	14
14	15
15 Mar2	31
15	SUP
15A	32
15B	33
15C	34
15D	35
16	24
17	SUP
17 Rev.	16
17A	17
18	18
19	19
19A	20
20	36
20A	37
20B	38
20C	39
20D	40
21	SUP
21A	SUP
22	SUP
23	41
24	SUP
25 MOD	SUP
25 Mar2	25
26	26
27	27
27 Aer2	27 Aer2
28	28
29	29
29A	30
A	SUP
B	SUP
C	42
CA	43
CB	44

Resolutions

(WARC Identifier/Final Number)

AA	35	AY	2	BW	6
AB	201	AZ	300	BX	37
AC	315	BA	301	BY	4
AD	7	BB	308	BZ	103
AE	66	BC	503	CA	1
AF	10	BD	100	CB	403
AG	63	BE*	-	CC	405
AH	65	BF	407	CD	68
AI	32	BG	402	CE	316
AJ	60	BH	400	CF	64
AK	36	BI	401	CG	5
AL	601	BJ	67	CH	701
AM	62	BK	61	CI	31
AN	200	BL	406	CJ	700
AO	305	BM	510	CK	504
AP	506	BN	640	CL	34
AQ	307	BO	33	CM	505
AR	314	BP	3	CN	310
AS	304	BQ	101	CO	600
AT	309	BR	38	CP*	-
AU	507	BS	500	CQ	509
AV	303	BT	404	CR	641
AW	306	BU	501	CS	102
AX	302	BV	642	CT	9

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*Letters not used.

Resolutions (cont'd.)

CU	30
CV	8
CW	703
CX	16
CY	11
CZ	15
DA	312
DB	311
DC	12
DD	313
DE	13
DF	17
DG	14
DH	202
DI	508
DJ	502
DK	702

Recommendations

(WARC Identifier/Final Number)

A*	-
B	11
C	204
D	30
E	68
F	202
G*	-
H	500
I	501
J	73
K	62
L	66
M	63
N	710
O	709
P	69
Q	60
R	64
S	70
T	705
U	712
V	403
W*	-
X	102
Y	405
Z	711
ZA	103
ZB	61
ZC	506
ZD	508
ZE	101
ZF	507
ZG	9
ZH	603
ZI	2
ZJ	402
ZK	400
ZL	505
ZM	65
ZN	71
ZO	74
ZP	502
ZQ	708
ZR	72
ZS	503
ZT	620
ZU	703
ZV	704
ZW	305
ZX	404
ZY	310
ZZ	200
YA	203
YB	309
YC	504
YD	300
YE	301
YF	406
YG	31
YH	67
YI	5
YJ	4
YK	601
YL	307
YM	302
YN	401

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*Letter(s) not used.

Recommendations (cont'd.)

YO	308
YP	304
YQ	306
YR	313
YS	201
YT	312
YU	702
YV	707
YW	706
YX	100
YY	701
YZ	600
XA	605
XB	407
XC	700
XD	602
XE	1
XF	10
XG*	-
XH	6
XI	604
XJ	303
XK	7
XL	311
XM	12
XN	8
XO	3
XP	13

[Whereupon, at 11:31 a.m., the committee adjourned, subject to call of the Chair.]

APPENDIX

[From the IEEE Transactions on Electromagnetic Compatability, vol. EMC-23, No. 3, August 1981]

A NONTECHNICAL OVERVIEW OF THE 1979 WARC

(Richard E. Shrum, Associate Member, IEEE)[1]

Abstract—The 1979 World Administrative Radio Conference (WARC-79) was the largest, most complex multilateral negotiation ever held in the field of telecommunications. The paper focuses on the nontechnical aspects of the Conference, including a brief history of the International Telecommunication Union (ITU) leading up to the WARC. The preparatory activities of the United States, both domestic and international, are described. A brief account of the attitudes and views of several foreign country groups during the Conference and the difficulties in selecting a Chairman is given. The results of WARC, which are in general regarded as a success, are discussed in relation to three areas: accomplishment of the broad U.S. objectives, the program of future radio conferences, and technical cooperation and assistance. Finally, the paper describes the implementation process in the United States and comments on some important implications for the future.

INTRODUCTION

The 1979 World Administrative Radio Conference (WARC-79) was the largest, most complex multilateral negotiation ever held in the field of telecommunications. After eleven weeks of intensive discussions, its decisions established a revised and updated international framework for the use of radio and the geostationary orbit. The results of the Conference are widely regarded as a success, in spite of the large number of complex and difficult issues that were considered, and serve as an excellent example in today's world of what is achievable when nations come together in a spirit of compromise and international cooperation.

A BRIEF HISTORY

The International Telecommunication Union (ITU), founded in 1865 as the International Telegraph Union, is the oldest existing organization associated with the United Nations. As the U.N. Specialized Agency for telecommunications, its purpose is, in general, to promote and foster international telecommunications on a worldwide basis and, in particular, to harmonize the orderly and efficient use of the radio-frequency spectrum and the geostationary satellite orbit. In the field of radiocommunications, the ITU has developed a large volume of rules and guidelines called the Radio Regulations at a series of international radio conferences held since 1903. The agenda of these conferences has been to review and revise as necessary, either in whole or in part, the Regulations or to carry out planning of a radio service and frequency band or bands.

The WARC, which was held from September 24 through December 6, 1979, in Geneva, Switzerland, was the most recent in this long series. It was a general conference in the sense that it had the power to consider all uses of the radio-frequency spectrum as well as the related technical and procedural provisions.

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[1] Manuscript received December 23, 1980. The views expressed in this paper are entirely those of the author and do not necessarily reflect or predict the policies of the Department of State or the U.S. Government.

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At the same time it was much more limited than its predecessor in 1959 since it was not empowered to treat the aeronautical and maritime operating provisions which comprise approximately half of the volume, to carry out detailed planning of specific radio services, nor to consider certain other parts of the Radio Regulations. In the period between 1959 and 1979, there were eight specialized radio conferences pertaining to a limited aspect of radiocommunications, such as space, maritime, aeronautical, and broadcasting satellite.

The ITU Plenipotentiary Conference in 1973 took the first step to convene WARC–79. It noted that some of the regulations should be reconsidered in the light of technical advances, particularly with regard to certain radio services which were developing rapidly. The agenda for the Conference was discussed in subsequent annual meetings of the ITU's Administrative Council, which adopted a draft agenda in 1976 and a final agenda in 1977. The agenda, date, and venue were approved by a large majority of ITU members in accordance with procedures set forth in the ITU Convention.

PREPARATIONS FOR WARC

The preparations for WARC–79 were by far the most extensive ever undertaken for an ITU or any other telecommunications event. This was to be the first general conference in twenty years. Results of the WARC are expected to guide the development and use of communication-electronic equipment and the operation of national and international radio systems into the next century. Therefore, it was natural that there was deep and widespread interest in all sectors of the telecommunications community within and outside the United States.

Within the United States, the National Telecommunications and Information Administration (NTIA) (and its predecessor, the Office of Telecommunications Policy), as manager of the Federal Government sector in this field, formally began its preparation in January 1974 when its Interdepartment Radio Advisory Committee (IRAC) established a preparatory group. All federal agencies with major radio interests participated actively in this effort. The Federal Communications Commission (FCC), as regulator of private sector telecommunications, initiated formal public proceedings on WARC preparations in January 1975. An internal steering committee and a formal advisory committee were established to provide overall coordination of and public input to the Commission's efforts. The Commission issued a total of nine Notices of Inquiry on various aspects of the WARC agenda and a final Report and Order which were widely distributed both domestically and internationally.

The Department of State worked closely with OTP/NTIA and FCC on the development of national proposals from the beginning in 1974. In addition, the Department began in 1975 to consider other aspects of the preparatory effort such as funding for U.S. Delegation participation and selection of the head of delegation. This effort was formalized in September 1976 with the creation of a senior-level policy group comprised of the Department's Deputy Assistant Secretary responsible for telecommunications, the OTP Director (subsequently the Administrator of NTIA), the FCC Chairman, and senior officials from other agencies.

In early 1977, the Department initiated a worldwide effort through its overseas posts to obtain foreign views and other details regarding preparation for the WARC–79 which provided important input to our domestic preparatory process. In January 1978, the Department named the Chairman of the U.S. Delegation to the WARC. An initial delegation group was formed in April 1978 with membership drawn from Federal Government agencies and a public advisory committee was established one month later consisting of a balanced membership drawn from industry and the general public. The purpose of both groups was to assist the Chairman of the U.S. Delegation on all WARC matters and to develop positions and strategies for the Conference.

The Department received recommended proposals from the FCC and NTIA in December 1978 as a result of their four years of study and preparation. These were melded into a unified set of U.S. proposals for transmittal to the ITU, all but one part of which were sent to Geneva in January 1979. Proposals relating to frequency allocations below 27.5 MHz were forwarded to the ITU several months later, after resolution of different views regarding requirements for international short-wave broadcasting.

The massive preparatory effort resulted in specific U.S. objectives for WARC–79 that were contained in more than 900 individual items submitted to the Conference as the formal U.S. proposals. In addition, the United States developed four general objectives to provide broad guidance to the Delegation, as follows:

(1) To achieve international agreement on necessary changes in the ITU Regulations on the orderly use of the electromagnetic spectrum in order to enhance U.S. economic, social, and national security interests.

(2) To maintain those ITU procedures which provide maximum flexibility and adaptability to changing needs.

(3) To support incremental changes in international allocations and related frequency management procedures which will accommodate the needs of other nations consistent with our own essential requirements, while endeavoring to avoid or limit the impact of politically inspired efforts to restrict our use of the spectrum.

(4) To ensure an outcome of the Conference which will support the role of the ITU as the international organization responsible for implementing WARC decisions while not adversely affecting sovereign rights of the United States.

The ITU itself was very active in preparing for the Conference. The Study Groups of the International Radio Consultative Committee (CCIR) had many questions under study which were directly relevant to the agenda of WARC–79. A Special Preparatory Meeting (SPM) was held from October 23 to November 17, 1978 to collate and focus the work of the CCIR. The resulting report provided an extremely valuable technical basis for the use of countries in preparing their proposals and for the Conference deliberations. The ITU also held three regional seminars in early 1979 in preparation for WARC, primarily for the benefit of developing countries.

In the international area, the United States engaged in an extensive series of international consultations on WARC beginning in 1977 with a view to explaining U.S. views on the Conference and obtaining information on foreign positions. Substantial effort was given to and emphasis placed on visits by small teams of U.S. experts to foreign capitals to carry out face-to-face discussions with appropriate telecommunications officials and organizations. While not table to visit all countries desired, it was possible to visit forty-eight countries including Algeria, Argentina, Cameroon, People's Republic of China, Indonesia, Kenya, Peru, United Kingdom, and the U.S.S.R.

THE CONFERENCE

At the time of the Conference, the Union consisted of 154 member countries. 142 members participated in the Conference and were represented by nearly 1700 delegates and advisers. Also present were approximately 130 observers from a private operating agency, the United Nations and its Specialized Agencies, regional organizations, and other international organizations. The United States participated in WARC–79 with an accredited delegation of 69 members including two Congressional advisers, supported in Geneva by a group of 40 persons consisting of technical, computer, and administrative personnel, and by a home team in Washington.

The Conference was eleven weeks of strenuous work, probably too long in view of the extended absences of key telecommunications officials from their jobs. It was an intensive period of difficult negotiations, yet it was hardly long enough because of the large number of proposals that had to be considered and the critical issues to be decided, many of which were extremely complex due to the technical, economic, operational, social, and political aspects involved. Before the end of the Conference nearly 17,000 individual proposals had been handled and more than 900 meetings had been held. It was also a difficult conference just because of its size, the wide variations in background and experience of the delegates, and the many direct conflicts in basic requirements and objectives of the participating countries.

This was not surprising since WARC–79 was the first general conference to be held in twenty years. There were many important issues and requirements to be treated under its agenda and, in many cases, they involved direct conflict of objectives among the ITU members. The membership of the ITU had increased 60 percent since 1959 entirely through the addition of developing countries. The WARC itself, as well as several of the key issues, were actively discussed in various nonaligned and developing country forums. In view of these facts, the

United States and most other participating countries expected WARC–79 to be different from and more difficult than its predecessor in 1959 and the more recent specialized radio conferences.

Prior to the Conference, some observers had predicted that the North-South political confrontation would be the main order of business. Concern was expressed that the ITU would go the way of other U.N. Specialized Agencies and become a forum in which international agreement on tangible objectives is replaced by ideological confrontational debate. Of special concern was the fear that WARC would take up the discussion of the so-called New World Information Order (NWIO). Such a course would divert the Conference from its proper task and impede the constructive negotiation on concrete objectives of radio spectrum regulation. The record speaks for itself. There was no rhetorical debate over an NWIO and, in general, very little political discussion that was not directly relevant to the technical, economic, and operational tasks which had been assigned to the Conference. However, some of the broader North-South political tensions that underlied the NWIO debate were present throughout the Conference surfacing in various ways.

The most difficult issue of this type involved the selection of a Conference Chairman. In the year or more preceding the opening of the Conference, widespread support had developed for one particular individual. His name had been mentioned at the various regional preparatory seminars prior to the Conference and his candidacy was endorsed by the United States. There was no opposition until several months prior to the Conference. In an unprecedented move for ITU radio conferences, one government pressed for its candidate through diplomatic channels and obtained support at a nonaligned summit meeting in the form of a resolution calling for a nonaligned country chairman of the WARC.

Several days before the opening date of the Conference, it became obvious that a serious problem was developing. For the first time, the ITU was faced with the possibility of a vote for the Chairman of a Conference. Much more troublesome was the fact that the vote would be made along political and ideological lines which would jeopardize the chances for a successful conference in the scheduled ten week duration. The United States firmly maintained its position that the slate of conference officers must be adopted by consensus, thereby indicating acceptance by all participating Administrations. The next few days saw an extensive continuous round of negotiations by a handful of key individuals while the vast majority of delegates could do nothing but wait for the Conference to begin. The breakthrough came when the Latin Americans were asked to provide a candidate for Chairman which they did in the form of an Argentinian. WARC–79 held its first Plenary three days later than intended, adopting the compromise slate of officers by consensus.

On other issues, the situation regarding North-South relations was considerably more complex. A few developing countries clearly arrived at the Conferences with a confrontational attitude. Their rhetoric at nonaligned meetings and in various regional forums gave an early indication that they were set to do battle at the Conference. While their numbers were few, their voices were often heard and influential. The majority of the developing countries apparently were not looking for a confrontation and indeed generally remained on the sidelines. Nevertheless, there appeared to be a feeling among the developing nations that their solidarity must be maintained. It was only through the traditional ITU concept of reaching decisions by consensus rather than majority rule, combined with Delegation perseverance in seeking solutions acceptable to all members, that bloc voting was not more prevalent. The United States found the majority of developing country representatives willing to work with us on many issues and received support on a wide variety of issues.

There were several general principles that appeared to characterize the positions taken by developing countries throughout the Conference. An obvious objective was to gain preferential treatment for themselves as shown, for example in the Algerian proposal to give priority to developing countries in the high-frequency fixed bands. This principle was also evident in a number of resolutions, recommendations, and specific changes to the Regulations where the Conference recognized the special needs of developing countries. Closely related was the forceful and relatively successful effort by developing countries to achieve a guarantee for access to congested frequency bands and geostationary satellite orbit resources. WARC took initial steps in this direction in its adoption of resolutions calling for planning of the HF broadcasting bands and of the space services and use of the geostationary orbit.

In the area of allocations, developing countries typically refused to recognize or appreciate the requirements and existing investments of certain advanced systems such as U.S. military radar and in some cases attempted to eliminate or reduce the allocation provisions. At the same time, they refused to accept even small changes in many bands that might have any effect on their existing operations. Another general trend that caused some difficulty was the obsession by many developing nations to add Fixed and Mobile services to allocations in many higher bands up to 30 GHz. This tendency was a primary factor in the large increase in the number of Footnotes in the Table of Frequency Allocations. Finally, a constant source of exasperation in the North-South relationships was the unwillingness of the developing nations to link decisions on various issues or accept the notion of a package deal. When attempts were made to establish linkage between U.S. concessions in one area to developing country concessions in another, the usual reply was that the advanced nations have the necessary technology to find some other solution.

WARC DECISIONS

In spite of the complexity, length, and difficulties, it was the unanimous conclusion of the delegations and the ITU officials at the close of the Conference that WARC–79 was a success. The Secretary General in his closing remarks to the Conference went so far as to describe it as "a brilliant success." Understanding and cooperation leading to consensus and agreement—the traditional ITU working method—resulted in the adoption of new Radio Regulations which will govern the various radio services in the use of the frequency spectrum until at least the end of the century. The 1979 Regulations will enter into force on January 1, 1982 for those countries which have indicated their approval to the ITU.

The United States shares in the view that the WARC was successful in carrying out its objectives. We were impressed by the general absence of political debate and the ultimate satisfactory resolution of most of the technical issues. Despite concerns we may have about a few particular decisions taken by the Conference as expressed in U.S. reservations contained in the Final Protocol, we believe that the modified regulations will provide a sound technical and regulatory framework for the expansion of communication facilities in the United States and abroad in the coming years. At the same time, a significant degree of order in the uses of the spectrum allocations by the many radio services has been maintained.

The United States submitted over 900 proposals, each one important in varying degrees to some national, social, economic, or national-security need. Almost all of the specific U.S. objectives were attained, either in whole or in substantial part. Our four general objectives—to achieve international agreement, to maintain maximum flexibility, to support incremental changes, and to support the role of the ITU—were achieved, at least for the immediate future. There will be no immediate or drastic changes in the structure and operation of the U.S. telecommunications system as a result of Conference decisions. In fact, many changes mandated by the Conference will be phased in over an extended period of time.

For the first time at any WARC, the agenda called for the Conference to propose to the Administrative Council and to the next Plenipotentiary Conference a program for convening future administrative radio conferences to deal with specific services. There is a popular misconception that the decision to recommend a series of future specialized conferences was an escape route for unresolved issues. This was not the case in general since it was a necesary exercise in recognition of the fact that WARC–79 did not have the mandate to carry out planning, to review the general Mobile service provisions, and to treat certain other parts of the Radio Regulations. On the other hand, the heated debate regarding access to the satellite frequency bands and the geostationary orbit resulted in a resolution calling for a Space Planning WARC. The Conference was unable to take a decision on the very difficult questions of which frequency bands and space services and what type of planning, and therefore differred these unresolved issues until the future conference.

WARC–79 adopted a number of resolutions and recommendations laying out each specialized world or regional conference, a suggested agenda, and in some cases, a tentative date. The program of future conferences laid out by the WARC must be viewed as a recommended program only. In fact, the Administrative Council held in June 1980 took action at its meeting to modify substantially the proposed scope of one of the future conferences, i.e., the 1982 Mobile WARC. The June 1981 Council session, in recognition of the need for more time to carry out adequate preparations and to reduce the financial impact on the ITU budget, made even greater changes to the recommended conference program in regard to the planned dates. Each proposed conference will be further considered at future Council meetings and, as appropriate, by the 1982 Plenipotentiary Conference.

The 1981 Administrative Council established a schedule for the most important future conferences as follows:

(1) WARC for the Mobile Services, February 1983;

(2) Region 2 Broadcasting Satellite Planning Conference, June 1983;

(3) WARC for Planning of the HF Broadcasting Bands (First Session), January 1984; Second Session to be held in January 1986;

(4) WARC on the Use of the Geostationary Satellite Orbit and the Planning of Space Services Utilizing It (First Session), July 1985; Second Session to be held in September 1987.

During WARC–79 there was a strong sentiment on the part of delegations from developing countries that there should be new or increased programs to assist them in technical cooperation and assistance in the field of telecommunications. In particular, they were keenly interested in achieving their rights and in meeting their responsibilities under the ITU Radio Regulations. The primary means of expression were the various resolutions and recommendations that they drafted and the Conference adopted. However, some provisions were also inserted directly in the body of the Regulations. An example is the addition of a provision which specifies that the ITU is to provide certain technical assistance, particularly to countries in need of special assistance, in complying with the procedural requirements relating to advanced publication and coordination of frequency assignments in space services.

The Conference adopted fifteen resolutions and recommendations that relate directly to technical cooperation and assistance to developing countries. The United States actively supported some of these resolutions and recommendations and joined in the consensus adoption of the others. It is clear that cooperation and assistance which yields an increased knowledge and improved understanding of technology, operation and frequency management, will result in more efficient and orderly use of the radio-frequency spectrum to the benefit of all ITU members. For the future, it is fully expected that the subject of technical cooperation and assistance will become increasingly important to the majority of ITU members. Therefore, it will be a major issue at the upcoming administrative radio conferences, the annual Administrative Council sessions, and the Plenipotentiary Conference scheduled for September 1982. This is an area where the United States and other industrialized nations can take the initiative to develop appropriate cost-effective programs—unilaterally or in conjunction with the ITU or other organizations—that will improve our working relationship with developing countries at future ITU conferences.

IMPLICATIONS FOR THE FUTURE

First and foremost among the actions required following WARC–79 is to make the national decisions regarding implementation of the results in the United States. The NTIA, as manager of the Federal Government sector, and the FCC, as regulator of the private sector, are responsible for implementing the new regulations domestically. Both agencies began the process immediately after the Conference with the objective of completing the necessary actions by January 1, 1982. FCC actions will result in changes to its Rules and Regulations, while the NTIA will amend the Federal Government Manual for Frequency Management. At the same time, the Department of State, working closely with NTIA, FCC, and other affected parties, undertook an assessment of the WARC results. The Final Acts were submitted to the President in mid 1981 with a recommendation for ratification as a treaty, and shortly thereafter to the Senate for advice and consent. It is expected that the WARC results will be ratified before the end of 1981.

A high priority for the United States in the foreseeable future is to ensure appropriate preparation for the upcoming radio conferences. The program is very ambitious and may be impossible to follow in practice. It places a heavy preparatory burden on all Administrations, particularly on developing countries. It will be very difficult to carry out adequate and complete technical preparations by the CCIR and the IFRB which have already been heavily tasked by the WARC–79 decisions. Personnel and budget resources in both the ITU and individual Administrations are probably insufficient to meet the proposed schedule or at best will be severely strained. However, because of the various pressures that exist, it appears inevitable that the proposed program will take place pretty much as described above.

It must be emphasized that each conference involving Region 2 (the Americas) will treat radio matters of at least substantial and sometimes vital interest to the United States. Active participation in all such radio conferences is essential for the United States in order to serve our national interest and because of our strong commitment to international agreement and harmony in the use of the frequency spectrum and the geostationary orbit. It is, therefore, very important that the concerned Government agencies, private industry, and the affected radio-user groups be aware of the future conference program. Early planning is necessary to ensure that appropriate steps are taken to prepare for and participate in the various conferences.

One might even view WARC-79 and the program of future conferences as one continuous ITU conference with the former simply being the first session. It can be expected that many of the issues and concerns discussed in 1979 will touch each of the future events. In addition, some of the proposed conferences will be considered by the Plenipotentiary Conference to be held in late 1982. It is difficult to predict the outcome of that conference which tends to be more political in nature, particularly in regard to the sensitive WARC for the Planning of Space Services and the Use of the Geostationary Orbit.

It is a pleasure to note that technical, economic, and operational bases predominated the negotiations at WARC-79 with few exceptions. Major ideological debate on such issues as the NWIO did not occur. However, while the ITU and the international regulatory scheme came out in good shape, it will be tested again in the series of specialized administrative radio conferences and the upcoming Plenipotentiary. It is still a possibility that the ITU will receive undesirable spillover from other more political forums. There will still be underlying economic and political tensions between developed and developing countries, particularly in the area of future rights to the frequency spectrum and geostationary orbit and of technical cooperation and assistance. A risk will exist for an impasse in negotiations, and it is possible that some conferences may adjourn without consensus and agreement or that blocs of countries will refuse to go along with the majority on important issues. It is a fair conclusion that the effectiveness of the ITU and its international regulations will be threatened again in the upcoming years. It is essential that the objective of all countries must be international cooperation and agreement arrived at through reasonable compromise by both the developed and developing, taking into account the real requirements of all interests involved.

It is inevitable that changes in the ITU will continue, but it is still too early to predict if they will be for good or bad, evolutionary or drastic, reasonable and well-founded, or extreme and revolutionary. Individuals in industrialized countries will continue to ask the question whether the ITU still fulfills the basic purposes of the Union as laid out in the Convention. And in so doing, they will suggest that it may be better for the United States and other developed countries to leave the ITU to establish a new forum where international technical and operational collaboration could continue as a primary objective. The United States will find it increasingly necessary to consider this question as it prepares for the difficult agenda ahead of us.

[From the Virginia Journal of International Law, vol. 21, Fall 1980, No. 1]

Regulating International Airwaves: The 1979 WARC

GLEN O. ROBINSON*

I. INTRODUCTION: INFORMATION ORDERS OLD AND NEW

The past decade has seen a flowering of interest in international policy issues concerning communications. In part, this interest reflects the increasingly visible and important role of communications and information services in international economic, social, and political relations. The dramatic growth of telecommunications services, such as satellite communications, is one illustration.[1] Another is the equally impressive growth in the use of computers, which has facilitated communications and data flows.[2] Moreover, beyond the growth of distinctively international communications and information systems, the growth in domestic systems has stimulated global interest. Indeed, it is increasingly difficult to distinguish national from international communications; each has become almost inevitably the other, in effect if not by design.[3]

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[1] Over two thousand satellites have been launched since 1957. UNESCO INTERNATIONAL COMMISSION FOR THE STUDY OF COMMUNICATION PROBLEMS, MANY VOICES, ONE WORLD 63 (1980). Besides facilitating communications in the conventional sense, satellites serve other functions such as radiolocation (radar), meteorological and earth sensing (remote sensing), and surveillance. In a broad sense, all of the satellites convey "information."

An estimated two-thirds of the satellites in use are military. *Id.* at 63 n.2. Aside from military systems, international communications satellite service is dominated by a single system, INTELSAT, a global consortium of some 102 member countries which directly or indirectly serves over 130 countries. COMSAT Study, 77 F.C.C.2d 564, 589-90 (1980). COMSAT, a semipublic corporation, represents the United States in the INTELSAT consortium.

The increased economic and social importance of the new communications and information systems has prompted some specula-

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For a description of the system, see *id.* at 589-99. INTERSPUTNIK, a Soviet counterpart to INTELSAT, also claims to be a global system, but essentially is limited to the Eastern Bloc. UNESCO INTERNATIONAL COMMISSION FOR THE STUDY OF COMMUNICATIONS PROBLEMS, *supra*, at 63.

There recently have emerged specialized systems such as INMARSAT, a newly established global consortium on the model of INTELSAT, which will provide maritime satellite communications to some 40 countries. INMARSAT will replace MARISAT, a U.S. system operated by COMSAT. *See* HOUSE COMM. ON FOREIGN COMMERCE, INTERNATIONAL MARITIME SATELLITE TELECOMMUNICATIONS ACT, H.R. REP. No. 95-1134, 95th Cong., 2nd Sess. 5-10 (1978). For many years there has been consideration of an aeronautical satellite system (AEROSAT); however, plans are in limbo for the indefinite future primarily because of budgetary constraints and waning U.S. interest. *See* HOUSE COMM. ON SCIENCE AND TECHNOLOGY, AUTHORIZING APPROPRIATIONS TO THE FEDERAL AVIATION ADMINISTRATION FOR RESEARCH AND DEVELOPMENT, H.R. REP. No. 95-95, 95th Cong., 1st Sess. 30-32 (1977).

Only a handful of domestic and regional satellite systems exist, but they are an increasingly important component of global communications. Major systems include Westar, Comstar, and Satcom in the United States, Canada's Anik, the Soviet Union's Molnia, and Indonesia's Palapa. Domestic or regional systems are under development throughout the world, not only in Western Europe and Japan, but also in countries such as India, Nigeria, Colombia, Thailand, and the Arab countries of the Middle East. Many of these countries now lease INTELSAT circuits for domestic use, but there is a strong movement towards independent national or regional systems. *See* Wigand, *The Direct Satellite Connection: Definitions and Prospects*, J. COM., Spring 1980, at 140.

2. Computerized communications have sparked a major controversy over transborder data flows transferring sensitive information across national boundaries. *See, e.g.*, Gotlieb, Dalfen & Katz, *The Transborder Transfer of Information by Communications and Computer Systems: Issues and Approaches to Guiding Principles*, 68 AM. J. INT'L L. 227 (1974); *Symposium—Transnational Data Flows: New Frontier—Or None?*, J. COM., Summer 1979, at 113-55.

3. Depending on power, propagation characteristics, and patterns of use, virtually all radio communications are potentially international. For most countries it is extremely difficult to avoid transborder "spillover" of satellite signals. On the other hand, some national satellite systems, *e.g.*, national meteorological or remote-sensing satellites, are designed to have extraterritorial effects. Even though these systems do not transmit signals across borders, their social and economic impact is the subject of significant debate. *See* note 11 *infra*.

Apart from such direct effects, indirect effects of communications/information activity inevitably cross national boundaries. For example, many popular U.S. television and film productions are purchased by and rebroadcast over foreign networks. CBS' *Dallas*, for instance, is seen by audiences around the world. Such cultural "spillover" is a basic issue in the whole debate over information flow. *See* note 10 *infra* & accompanying text.

tion about the coming "information age."[4] It also has sparked some interesting but quite abstract discussion of the public policy implications of the new dependence of economies and societies on information and communications technology.[5] One aspect of the latter, namely, how new communications and information activities can be developed fairly and equitably to the advantage of all nations, raises global policy implications.

In many respects, the concern over the equitable development of these activities is just one aspect of a larger debate. The North-South dialogue over fair and equitable distribution of economic wealth produced some years ago several U.N. resolutions calling for a "New International Economic Order."[6] Another slogan recently has emerged to address specifically the newly discovered importance of information and communication activity: the "New World Information Order."[7] Although recently endorsed by the United

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[4] It has been forecast that revolutionary technological advancements in telecommunications and electronic computing will precipitate significant economic, institutional, and political changes in society. *See, e.g.*, Porat, *Communication Policy in an Information Society*, in COMMUNICATIONS FOR TOMORROW 3 (G. Robinson ed. 1978).

[5] Porat's analysis states clearly the broad social and economic implications of an "information economy," but it also makes some highly dubious generalizations about the impact of an information economy on such matters as productivity, property rights, and literacy. *See id.* at 32-43. The entire concept of an "information economy" or "information society" is built upon a set of abstractions that are too grand for useful policy analysis in most instances. Porat's own calculations, which show, for example, that nearly one-half of the U.S. gross national product originates in the production and distribution of information, *id.* at 8-11, involve some manipulation of national income accounts in ways that are more sociologically interesting than economically relevant.

[6] G.A. Res. 3201, U.N. Doc. A/Res/3201 (6th Special Session 1974) (Declaration on the Establishment of a New International Economic Order); G.A. Res. 3202, U.N. Doc. A/Res/3202 (6th Special Session 1974) (Programme of Action on the Establishment of a New International Economic Order); G.A. Res. 3281, 29 U.N. GAOR, Supp. (No. 31) 50, U.N. Doc. A/9631 (1974) (Charter of Economic Rights and Duties of States). *See generally* CLUB OF ROME, RESHAPING THE INTERNATIONAL ORDER (1976).

[7] *See, e.g.*, M. MASMOUDI, THE NEW WORLD INFORMATION ORDER (UNESCO International Commission for the Study of Communications Problems, Report No. 31, 1978); UNESCO, INTERNATIONAL COMMISSION FOR THE STUDY OF COMMUNICATION PROBLEMS, *supra* note 1, at 137-55. On the relationship between the economic and information orders, see C. HAMELINK, THE NEW INTERNATIONAL ECONOMIC ORDER AND THE NEW INTERNATIONAL INFORMATION ORDER (UNESCO International Commission for the Study of Communication Problems, Report No. 34, undated). The new international information order has been defined as the "international exchange of information in which states, which develop their cultural system in an autonomous way and with complete sovereign control of resources, fully and effectively participate as independent members of the international community." *Id.* at 8. A new information order is viewed by some as essential to the advent of a new economic order. *Id.* at 1.

Nations in a slightly modified form,[8] the slogan is yet without much definition. It is the product of a debate over international information flows—specifically over competing principles of "free" versus "balanced" flow of information across national boundaries.[9] The debate has been fueled by Third World expressions of discontent with the "cultural imperialism" of the existing "order" —which the new information order supposedly is intended to correct.[10] A parallel but more highly focused controversy over information flow is the seemingly ageless debate in the U.N. Committee on the Peaceful Uses of Outer Space over satellite broadcasting and remote satellite sensing.[11] Branching out from the concern over these issues is the issue of equitable distribution of information resources which in turn has sparked discussion of development assistance programs in the communications and information field.[12] Finally, related to that issue is the newly emerging concern over the global management and use of the one common communications resource, the radio spectrum.[13] This latter debate has been conducted within the International Telecommunications Union (ITU), and most recently was the subject of negotiations at the 1979 World Administrative Radio Conference (WARC or Conference).

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[8] *See* G.A. Res. 33/115, 33 U.N. GAOR, Supp. (No. 45) 72, 74, U.N. Doc. A/Res/33/115 (1979) ("A new, more just and better balanced world information and communication order").

[9] For a good short review of the debate, see ACADEMY FOR EDUCATIONAL DEVELOPMENT, THE UNITED STATES AND THE DEBATE ON THE WORLD "INFORMATION ORDER" 26-33 (undated).

[10] Literature on "cultural imperialism" typically condemns the dominance of information flows and resources by developed countries, especially the United States. *See, e.g.*, H. SCHILLER, MASS COMMUNICATIONS AND AMERICAN EMPIRE (1970). Some works provide a more balanced treatment. *See, e.g.*, W. READ, AMERICA'S MASS MEDIA MERCHANTS (1976); J. TUNSTALL, THE MEDIA ARE AMERICAN (1977).

[11] For direct-broadcast satellites, the issue is whether satellite broadcasting across national boundaries should be subject to the prior consent of the country receiving the signal. Insisting on the free flow of information, the United States has opposed any requirement of prior consent, although it has supported a condition of prior consultation. Most other countries, however, are more concerned about the political or cultural impact of unrestrained broadcasting than about free flow of information. U.S. opposition effectively has stalemated the direct-broadcast satellite negotiations by preventing consensus on the Outer Space Committee. *See* Dizard, *Satellite Broadcasting and Communication Policy—The U.S. Position: DBS and Free Flow*, J. COM., Spring 1980, at 157, 167. *See generally* K. QUEENEY, DIRECT BROADCAST SATELLITES AND THE UNITED NATIONS (1978); Note, *Toward the Free Flow of Information: Direct Television Broadcasting by Satellite*, 13 J. INT'L L. & ECON. 329 (1979).

For remote sensing, the central legal issue again is prior consent. Many countries seek to prohibit data derived from remote sensing from being disseminated to any country without the consent of the sensed country. Some countries even have proposed that prior consent be a prerequisite to the act of sensing itself. *See* DeSaussure, *Remote Sensing by Satellite: What Future for an Informational Regime?*, 71 AM. J. INT'L L. 707, 720 (1977). *See generally* Comment, *Earth Resource Satellites, a Puzzle for the United Nations*, 16 HARV. J. INT'L L. 648 (1975).

[12] This debate has taken place primarily in UNESCO, which is a common forum for Third World discontent. *See* UNESCO INTERNATIONAL COMMISSION FOR THE STUDY OF COMMUNICATION PROBLEMS, *supra* note 1, at 219-22.

This article is a report on the 1979 WARC and its implications for the ITU. It is not about the new world information order, but the widespread identification of that movement with the WARC warrants some comment. Anticipating the 1979 WARC, many observers of the new world information order debate predicted that the Conference would provide a major opportunity to put the new world information order to the test.[14] It was a reasonable prediction given the proximity of the Conference to the U.N. endorsement of the new information order slogan. Although the agenda of WARC was highly technical, the political importance of international radio spectrum regulation to modern communications and information systems cannot be doubted. Much of the debate over such issues as international broadcasting, direct-broadcast satellites, and remote sensing obviously depends upon successful international regulation of radio frequencies because without some degree of cooperation and regulation these activities themselves would cease. In fact, in light of the dependence of other means of information transmittal, if the radio spectrum could not be used effectively, the entire debate over free flow of information would be rendered largely moot as the scale of international communications would be curtailed to negligible proportions.[15] One could indeed go further and point out that the uses of the radio spectrum affect virtually every facet of modern life throughout the world. Insofar as these uses would be influenced by the 1979 WARC, one might thereby leap to the conclusion that this Conference would be not only a major vehicle for debating the new world information order but one of the great international events of an era.

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[13] The radio spectrum is a vast, yet finite resource upon which telecommunications services depend. Although the spectrum cannot be used up, it cannot be used at all without careful coordination and effective management. *See* INTERNATIONAL INSTITUTE OF COMMUNICATIONS, TELECOMMUNICATIONS—NATIONAL POLICY AND INTERNATIONAL AGREEMENT—A BRIEFING PAPER IN PREPARATION FOR THE WORLD ADMINISTRATIVE RADIO CONFERENCE OF 1979, at 1-5 (1977).

[14] *See, e.g.*, Clippinger, *The U.S. Faces WARC: The Hidden Agenda*, J. COM., Winter 1979, at 197; Kramer, *Radio Spectrum—The Next Arena for Nonaligned Nations' Challenge*, Wash. Post, Sept. 23, 1979, § F, at 1, col. 1.

[15] Even the print media would be all but destroyed to the extent that they depend on radio telecommunications, and hence the radio spectrum, to assist in news gathering and dissemination.

It was something less than that. The 1979 WARC was not required or expected to establish new principles of spectrum use; its task was to adjust, at the margin, existing regulations governing spectrum allocations and use to accommodate new and future requirements. Nevertheless, such a task is undeniably important to the uses of communications and information, and thus could have significant influence on the new world information order dialogue. For this reason alone there was reason to believe that the same debate over political principles of the information order that have preoccupied other U.N. forums would reoccur at the 1979 WARC.[16]

It did not. The debate on general principles was left essentially untouched by WARC. What did occur, however, could have significant implications for the world information order old and new. Before examining what these might be, it is necessary to review briefly the structure and functions of the ITU, WARCs , and radio regulation in general.

II. THE ITU AND INTERNATIONAL RADIO REGULATION

The ITU, a specialized agency of the United Nations, is the oldest of all existing international agencies, with a lineage which dates back to 1865.[17] The basic purposes and powers of the ITU are prescribed by a permanent convention which is subject to periodic revision at plenipotentiary conferences.[18] The last such conference was held in 1973, and the next is scheduled for 1982. The operational rules, standards, and procedures of the ITU are prescribed in two sets of administrative regulations, one governing the international use of radio and one governing telephony and telegraphy.[19] These regulations are established and revised by periodic world administrative conferences with separate conferences being held for radio and telephony/telegraphy.[20] Since the Atlantic Radio Conference of 1947 in which the ITU joined the U.N. system, there have been two general world administrative radio conferences, one in 1959 and the other the 1979 WARC. These general WARCs were authorized to deal with virtually all aspects of radio spectrum allocation and regulation.[21] In between these general conferences there were seven specialized WARCs which dealt with particular areas of the spectrum or particular services.[22] In addition to these conferences, there are occasional regional radio conferences to plan frequency use within particular regions.[23] All of these conferences are scheduled by an Administrative Council, which currently is composed of 36 members elected by ITU countries at the plenipotentiary conferences. In addition, the Council meets annually to provide routine oversight of ITU operations.

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[16] *See* note 9 *supra* & accompanying text.

[17] The ITU became part of the United Nations pursuant to an agreement resulting from the Atlantic City Radio Conference of 1947. International Telecommunications Convention, Oct. 2, 1947, 63 Stat. 1399, T.I.A.S. No. 1901, 30 U.N.T.S. 316. For an excellent review of the evolution of the ITU, as well as a comprehensive analysis of its functions in the area of radio spectrum management, see D. LEIVE, INTERNATIONAL TELECOMMUNICATIONS AND INTERNATIONAL LAW: THE REGULATION OF THE RADIO SPECTRUM (1970).

[18] The original convention is the International Telecommunications Convention, Oct. 2, 1947, 63 Stat. 1399, T.I.A.S. No. 1901, 30 U.N.T.S. 316 (*entered into force* Nov. 15, 1947). Revisions are found at 18 U.S.T. 575, T.I.A.S. No. 6267 (*entered into force* May 29, 1967), and 28 U.S.T. 2497, T.I.A.S. No. 8572 (*entered into force* Apr. 7, 1976).

[19] The radio regulations are contained in International Telecommunications Union,

The ongoing operation of the ITU is the responsibility of a permanent bureaucracy. The permanent staff is somewhat balkanized into four more or less independent organizations, among whom there is considerable rivalry for influence of ITU affairs. General administrative and financial support of ITU activity is provided by a General Secretariat, directed by a Secretary-General and Deputy Secretary-General, both of whom are elected at plenipotentiary conferences. In addition, the Secretariat has the important func-

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World Administrative Radio Conference Radio Regulations (1979) [hereinafter cited as ITU Radio Regulations]. The regulations are cited by article number. Regulations governing telegraphy and telephony are contained in International Telecommunications Union, Final Acts of the World Administrative Telegraph and Telephone Conference—Telegraph Regulations, Telephone Regulations (1973). Telephone and telegraph regulations are developed under the auspices of the ITU International Telegraph and Telephone Consultation Committee (CCITT).

[20] *See* D. LEIVE, *supra* note 17, at 29-40.

[21] This requires some qualification. For example, the 1979 WARC agenda was limited to reviewing and revising those regulations relating to more than a single radio service, regulations allocating more than one service to any one band. The WARC agenda is set out in International Telecommunication Union, World Administrative Radio Conference [hereinafter cited as ITU-WARC], Agenda of the Conference, Doc. No. 1 (Sept. 29, 1978).

[22] The specialized conferences were a 1963 Space Conference, a 1964/1966 Aeronautical Conference, a 1967 Maritime Conference, a 1971 Space Conference, a 1974 Maritime Conference, a 1977 Broadcasting Satellite Conference, and a 1978 Aeronautical Conference.

[23] There are three ITU regions: Region 1 consists of Europe, Africa, the U.S.S.R., and Mongolia, Region 2, the Americas, and Region 3, the remainder of Asia and Oceania. THE INTERNATIONAL LAW OF COMMUNICATIONS 61 (E. McWhinney ed. 1971). Examples of regional conferences include the 1975 LF-MF Broadcasting Conference for Regions 1 and 3, the 1980 MF Broadcasting Conference for Region 2, and the forthcoming 1983 Broadcast Satellite Conference for Region 2.

tion of administering technical assistance to members on behalf of the U.N. Development Programme (UNDP).[24]

Technical advice on standards and operating procedures for radio services is provided by a consultative committee, the International Radio Consultative Committee (CCIR).[25] The CCIR, like the other organs of the ITU, is supported by its own permanent staff. The CCIR meets regularly in permanent study groups to deal with particular aspects of telecommunications. The topics studied, *e.g.*, interference protection standards and orbit utilization, may be suggested by the group itself or by an ITU Conference. Recommendations of the study group are presented to periodic conferences for endorsement in final CCIR recommendations or reports. These reports and recommendations in turn may be utilized in the implementation of ITU regulations, though generally they are not incorporated into the regulations. Although CCIR standards are not binding as a treaty obligation, they have been accepted and used by the ITU. As a result, the work of the CCIR has been extremely important in creating effective international standardization and regulation. Because of the technical professionalism of the group, the CCIR has offered a means of obtaining international agreement with minimal dispute over abstract or ideological issues. In this respect the CCIR has contributed substantially to the technical, apolitical character of the ITU itself.

The International Frequency Registration Board (IFRB) advises and assists developing countries in the effective use and registration of radio frequencies.[26] Because of its sympathetic advice and assistance to Third World countries, the IFRB has become a political rival to the Secretariat for influence in the ITU. Operationally, it is the key staff organ of the ITU. The IFRB consists of five members elected at plenipotentiary conferences. The IFRB maintains the international list of frequency assignments and, in the case of geostationary satellites, orbit positions. Responsibility for frequency assignments gives the IFRB central responsibility for interpreting and administering the radio regulations governing frequency allocations and use. Each frequency and orbit assignment notified to the IFRB by ITU members must be examined for conformity to the ITU regulations—for example, whether the assignment is in accordance with the international table of frequency allocations and whether it is compatible with other registered assignments. Although the Secretariat, and not the IFRB, is responsible for general technical assistance using UNDP funds, in fact much of the assistance involves IFRB expertise. In addition, the IFRB provides regular advice and assistance to members in connection with the selection and the proper notification to the IFRB of radio frequencies. Because selection and registration of frequencies are essential to international recognition, which in turn can be critical to effective use of any radio system, the IFRB functions obviously put it in a position of central influence and power.

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[24] *See* note 115 *infra* and accompanying text.

[25] A counterpart to the CCIR, the International Telegraph and Telephone Consultation Committee (CCITT), provides similar advice on wireline communications.

[26] For an explanation of the functions of the IFRB, see Khabiri, *International Frequency Registration Board Assistance to Member Countries of the ITU in Matters Relating to Frequency Management*, 19 IEEE TRANSACTIONS ON ELECTROMAGNETIC COMPATIBILITY 179 (1977).

It is not possible here to explain in detail the rather elaborate procedures for allocating and regulating the radio spectrum.[27] A general outline of the process, however, is a prerequisite to understanding the 1979 WARC. The regulatory scheme established by the ITU Convention contemplates making allocations of radio frequencies by broad service categories established at general administrative radio conferences. These service categories include radiolocation (radar), broadcasting, fixed service (point-to-point), and a wide array of satellite services—the services encompassing all the known uses of the radio spectrum. In making allocations, the degree of global uniformity varies. In some cases, allocations will be identical throughout the world; in other cases, they will be uniform only throughout a particular region; in still other cases, allocations are specific to a group of countries or even a single country.[28] Although in some instances allocations may be limited to a particular country, normally frequencies are not apportioned among individual countries. Frequencies allocated to a service are available for

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[27] A concise and current review of the basic process is given in International Telecommunication Union, Frequency Management and the Use of the Radio Spectrum and of the Geostationary Orbit, Doc. No. SYD/4b (1979) (mimeo paper prepared for regional seminar in Sydney, Australia, preparatory to the 1979 WARC) (copy on file with the author). A partially outdated but still useful explanation of the process is given in D. LEIVE, *supra* note 17, at 81-143.

[28] *See* ITU Radio Regulations, *supra* note 19, art. N7/5 Nos. 3415-3449. Countries seeking allocations in addition to or different from those approved by a majority of ITU members typically seek a special footnote provision to the table of allocations. If approved, as they usually are, such special footnote allocations have equal status with table allocations. *Id.* art. N7/5 Nos. 3433-3440.

use by any country subject only to technical or geographic limitations contained in the table of allocations or other regulations. Exception is made for certain services which are subject to so-called "a priori" or allotment plans[29] in which specific bands allocated to these services are parcelled out among individual countries in advance of specific use requirements. For example, certain maritime and aeronautical service frequencies are planned, as are broadcast-satellite service frequencies (and associated orbit segments) in one particular band, 12 GHz.[30] In addition, individual regions have various allotment plans for services—most commonly broadcasting services—within their respective regions.[31]

For unplanned services a country seeking to put a frequency allocation to use makes an "assignment" to an individual station. If the use could cause interference outside the territory of the country, or if it is for international communication, or if the assigning country seeks international recognition for its assignment, it must notify the IFRB and seek registration in the international frequency list.[32] Upon receipt of notification the IFRB reviews the assignment to ensure it conforms with the table of allocations and regulations and will not cause harmful interference with another registered assignment. If the IFRB makes a favorable finding, it registers the assignment. If it makes an unfavorable finding, it re-turns the notice for modification as appropriate to eliminate the problem. However, the notifying country still can obtain registration and favorable recognition if no interference complaints have been made in a specified period of time.[33] In the case of unplanned services, the precise legal protection that a first-notified frequency receives under the regulations is uncertain,[34] but in general, the intent of the regulations is to give the first-in-time protection in accordance with priority of registration dates—a system frequently but misleadingly described as "first-come, first-served."[35]

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[29] In the formal parlance of the ITU, "allocation" denotes the distribution of a frequency with a service, "allotment" denotes a distribution exclusively to an area or country, and "assignment" denotes a distribution to an individual station. *Id.* art. N7/5 No. 3414A.

[30] *See id.* Appendices 25 (plan for coast radiotelephone stations operating in certain maritime mobile bands), 26-27 (plan for certain aeronautical frequencies) & 29A (plan for broadcasting satellite service at 12 GHz). Radio waves often are specified by reference to a particular frequency. This may be misleading; to carry information at all, a wave must contain all the frequencies within a "band." The greater the frequency spread, or bandwidth, the more information may be transmitted. The specified frequency is the frequency at the center of this band. R. Brown, Telecommunications 94-95 (1970).

[31] A list of regional agreements appears in the ITU annual reports. Not all of the regional agreements prescribe allotment plans. For example, broadcast assignments in Region 2 currently are not planned, although they are subject to various regional and bilateral agreements designed to protect against interference, *e.g.*, North American Regional Broadcasting Agreement, Nov. 15, 1950, 11 U.S.T. 413, T.I.A.S. No. 4460 (*entered into force* Apr. 19, 1960). Region 2, however, recently decided to develop an allotment plan for MF (AM radio) broadcasting. *See The last act in Buenos Aires: U.S. must draw up five-year plan for AM allocations*, Broadcasting, Apr. 7, 1980, at 30-32.

[32] *See* ITU Radio Regulations, *supra* note 19, arts. N12/9, N13/9A. Many terrestrial frequency uses, *e.g.*, microwave relay systems, are contained effectively within national boundaries and hence are not registered with the ITU. Coordination arrangements with border countries usually suffice unless the terrestrial service is aligned with and must be coordinated with space services.

There are special provisions which very significantly qualify this oversimplified description. One example is the case of frequencies subject to allotment plans. Another is the case of international broadcasting, for which the procedure for coordination of program schedules recognizes no priorities. Instead, over one hundred countries that engage in international broadcasting exchange, on a quarterly basis, their respective program schedules so that they may coordinate their schedules and adjust them as necessary to avoid interference.[36] There is also a special procedure for satellite services under which administrations must give advance notice of intent to assign frequencies and to use orbital space with a view to making advanced coordination—and adjustments as appropriate —among administrations.[37]

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[33] *Id.* arts. N12/9 Nos. 4310A-4310C & N13/9A No. 4616.

[34] In the case of services subject to allotment plans and certain other assignments singled out by the 1979 WARC for special recognition, *see id.* art. N12/9 No. 4439, the protection is unequivocal: Frequency assignment in accordance with the plan receive protection from any subsequently registered assignment. In the case of unplanned services, however, the precedence of prior over later assignments is less clear. *See* D. LEIVE, *supra* note 17, at 155-58. *Compare* ITU Radio Regulations, *supra* note 19, art. N12/9 No. 4439 *with id.* art. N12/9 No. 4440.

[35] *See* D. LEIVE, *supra* note 17, at 158. The phrase, "first-come, first-served," misleadingly suggests that a prior use of a frequency neccessarily forecloses subsequent use. In practice, it is often possible to make room for a new assignment by relatively minor changes in operations. For example, the 1979 WARC adopted provisions empowering the IFRB to facilitate entry of new assignments in the high-frequency bands (the most congested part of the spectrum) by suggesting changes in either the new or the recorded assignment. ITU Radio Regulations, *supra* note 19, art. N12/9 Nos. 4462-4465. If no actual interference is reported, it may not even be necessary to make an adjustment. *Id.* art. N12/9 Nos. 4310-4311. The frequency list itself is a poor guide to what frequencies are available for use because the recorded assignments often do not reflect existing usage. The problem of so-called "deadwood" assignments has persisted for a long time despite efforts to correct it. *See* D. LEIVE, *supra* note 17, at 99-105. The 1979 Conference adopted regulations directing the IFRB to review and update the frequency list. *See* ITU Radio Regulations, *supra* note 19, art. N12/9 Nos. 4454A-4454E. Whether or not such review will resolve the problem, the provisions which give the IFRB new powers to facilitate registration and protection of frequencies by newcomers may ameliorate the problem by reducing the importance of priority of assignments.

[36] ITU Radio Regulations, *supra* note 19, art. N15/10. *See also* D. LEIVE, *supra* note 17, at 179-81.

III. THE 1979 WARC

The 1979 WARC was the largest conference in the history of the ITU, in terms of the numbers of participants, proposals, and decisions made.[38] It also may have been the most significant conference since 1947, although the long term effects of the Conference will not be known for some time to come. For the present, possibly the greatest accomplishment of the Conference lies not in what was done but in how it was accomplished—with a minimum of rhetorical or ideological confrontation and a strong emphasis on compromise and consensus.[39] It was widely predicted that WARC would be the occasion for a North-South confrontation over the principles of a new information order.[40] Some thought such a debate desirable as well as inevitable and strongly criticized the U.S. position that such a debate should be avoided.[41] According to these critics, WARC was an opportunity, to be seized and not shunned, for the United States to take a stronger initiative to support Third World aspirations and needs. Such initiatives never were defined precisely, but the thrust of the critics' demand was that the United States should offer greater technical assistance and should support Third World proposals to obtain "more equitable access" to the spectrum.

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[37] ITU Radio Regulations, *supra* note 19, art. N11.

[38] One hundred forty-two members of the ITU were represented at the Conference by over 1600 delegates and advisors. The U.S. delegation numbered 67, plus two congressional advisors and a support staff of 40. In addition, a number of other international organizations (U.N. agencies, INTELSAT, etc.) sent observers. *See* U.S. DEPARTMENT OF STATE, REPORT OF THE CHAIRMAN OF THE UNITED STATES DELEGATION TO THE WORLD ADMINISTRATIVE RADIO CONFERENCE OF THE INTERNATIONAL TELECOMMUNICATION UNION, SEPT. 24-DEC. 6, 1979, at 9 (undated) [hereinafter cited as WARC DELEGATION REPORT].

The total number of proposals is unknown, but it is estimated that in the area of allocations alone there were nearly 13,000. *Id.* at 32. The remainder of the proposals ran the gamut of technical (*e.g.*, technical characteristics of stations), regulatory (*e.g.*, assignment procedures), and administrative items (*e.g.*, identification of medical transport communications). *See generally id.* at 20-91.

[39] This is not to say that everyone agreed on everything. The United States entered reservations refusing to accept Conference decisions on five allocations issues. A total of fifty-one statements—mostly reservations—and thirty-two "counter statements" repudiating the reservations were filed in the WARC Final Protocol. *See* ITU-WARC, Final Protocol, Doc. Nos. 942 (Dec. 3, 1979) & 945 (Dec. 5, 1979). For the United States, this was a departure from past practice. Only once before, at the 1974 Maritime Conference, had the United States reserved on a conference decision. Most of the reservations, for the United States as for the other countries, concern relatively small details and do not undermine the effectiveness of the decisions taken. More troublesome was the increased use of footnotes to provide special allocations to individual countries different from those provided for the majority. Such special allocations are important for recognizing the distinctive needs of individual countries or groups of countries; however, easy resort to "tailor-made" allocations can undermine the uniformity that is needed for an international regime. For a good sketch of the WARC results on issues of primary importance to the United States, see *Why the sky didn't fall at WARC*, BROADCASTING, Dec. 17, 1979, at 44; *WARC is over; U.S. 'satisfied,' says Robinson*, BROADCASTING, Dec. 10, 1979, at 82. Technical detail is given in the WARC DELEGATION REPORT, *supra* note 38.

The U.S. position[42] was not hostile to considering such issues at WARC, insofar as they were relevant to the agenda, but the United States was not prepared to accede to all of the demands made by Third World countries or First World critics. Contrary to what was asserted with ritualistic regularity by critics before WARC,[43] the United States had no illusions that the WARC would be *purely* "technical." There was never any doubt that "political" factors—in a broad sense of that term—would be critical, despite the ostensibly technical character of the subject matter. One could scarcely imagine it otherwise; nations do not come together to discuss radio engineering in a vacuum of social, economic, and political interests. Technical factors of, for example, electromagnetic compatibility, should be and usually are a factor in deciding whether to allocate a particular frequency to a particular service, but such factors would be dispositive only if there were no competing social, economic, and political interests at stake. Purely technical cases are as uninteresting as they are exceptional. Just how exceptional can be appreciated if one surveys the process by which U.S. objectives and priorities were developed from among hundreds of competing government, industry, and other private sector demands.[44] In very few cases was the conflict resolved by simple reference to engineering data alone. Discussions with other delegations reveal that this same process is common for other countries having significant spectrum requirements.

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[40] *See* note 14 *supra*.

[41] *See* Branscomb, *Waves of the Future, Making WARC Work*, 34 Foreign Pol'y 139 (1979); White, *Uprooting the Squatters*, *id.* at 148.

[42] The U.S. position on these and other general issues is outlined in Robinson, *The U.S. Faces WARC: The U.S. Position*, J. Com., Winter 1979, at 150. *See also WARC '79: Curtain going up on telecommunications future*, Broadcasting, Sept. 17, 1979, at 35. The formal U.S. proposals are contained in ITU-WARC, Doc. Nos. 40-50.

[43] *See, e.g.*, White, *supra* note 41.

[44] The U.S. preparatory process is outlined in WARC Delegation Report, *supra* note 38, at 5-7. Essentially, three agencies coordinated their respective interests. The Federal Communications Commission (FCC) was responsible for all private, *i.e.*, nonfederal, uses of

A subject of political dispute *within* nations can scarcely be less so *among* them and WARC was not exceptional in this regard. What was exceptional, at least in the context of typical U.N. activity, was that the political negotiations and debate seldom ranged more broadly than the agenda required. Principles of North-South "equity," for example, generally were contained within issues directly relevant to particular issues under consideration—issues which were "technical" in form if not in ultimate significance. In this sense the U.S. objective of a technically oriented Conference was fully successful, and it obviously corresponded to the objectives of the overwhelming majority of Conference participants.

As always, one must acknowledge some exceptions to prove the rule. There were some instances of purely ideological or general political debate that went beyond the immediately relevant issues as defined by the Conference agenda. Most of these episodes were trivial as well as tangential to the main business.[45] Two "political"

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the spectrum, the National Telecommunication and Information Administration (NTIA) was responsible for all federal agency uses; and the Department of State looked after general foreign policy interests. Throughout, the emphasis was on compromise and consensus, responding to a broad and diverse constituency. Virtually no decisions were imposed without exhausting the possibilities for a consensus of affected agency and other interests. The internal domestic and international processes were in this respect remarkably similar.

The U.S. preparations for the 1979 WARC involved far greater effort than for any previous ITU conference. Preparations began as early as 1974 with the establishment of special study groups by NTIA's predecessor agency, the Office of Telecommunications Policy, and with the initiation by the FCC in 1975 of a public inquiry process to seek public comment and proposals. Over the ensuing five years, the preparations involved the active participation of some eighteen major federal agency users represented on the Interdepartment Radio Advisory Committee (a permanent planning unit of the NTIA), industry interests as diverse as AT&T and the offshore drilling industry, and public groups as diverse as the radio astronomers and church groups.

[45] Illustrative is a controversy between North and South Korea over assignment of call signs. In essence North Korea demanded one-half of a particular call sign series which had been assigned to the "Republic of Korea" since 1959 and which previously had been assigned simply to "Korea." Since North Korea was not a member of the ITU at the time when the assignment was changed, it claimed that the assignment was invalid for want of representation of its interests. South Korea resisted the fifty-fifty split on the ground that the 1959 designation had been proper and the call signs legitimately had come to be associated with it. Also, South Korea claimed a greater need for call signs than the North; hence, a fifty-fifty split appeared unreasonable in any case. Nothing of substance was involved other than a political contest over status recognition since other call sign series were available, yet the issue consumed excessive time and patience as each side lobbied every delegation repeatedly. The issue finally was resolved by what was labeled a compromise even

issues that were not trivial are worth passing mention. One was the issue of sovereignty claims to the geostationary orbit, a perennial U.N. topic.[46] After sharp debate, Colombia succeeded in attaching

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though it gave North Korea practically everything it sought. *See* WARC DELEGATION REPORT, *supra* note 38, at 83; ITU-WARC, Summary Records of the Twenty-Second Meeting of Committee 7, Doc. No. 925, para. 1.4, at 2 (Nov. 24, 1979); Summary Records of the Twenty-Ninth Meeting of Committee 7, Doc. No. 969, paras. 1.1.1-.3, at 2 (Nov. 29, 1979).

Other minor contests included a flurry of excitement in the credentials committee over the credentials of Democratic Kampuchea (the Pol Pot government), which the Soviets and their allies protested but the United States and the People's Republic of China supported. The credentials were accepted in committee, and the matter was not raised in plenary. (Kampuchea was, in any event, unable to vote because it had not ratified the ITU Convention.) A second minor skirmish arose when the Soviet Union challenged the authority of certain West German delegates who reside in Berlin, on the ground that the Quadripartite Agreement forbade Berliners from respresenting the Federal Republic of Germany. The committee rejected the challenge, which was not pursued further in plenary. *See* WARC DELEGATION REPORT, *supra* note 38, at 21; ITU-WARC, Summary Records of the First and Second Meetings of Committee 2, Doc. Nos. 176 (Oct. 2, 1979) & 725 (Nov. 21, 1979).

The credentials issues are noteworthy because they reveal that despite pre-Conference fears, political activity was very restrained. A major concern prior to the Conference was the possibility of a challenge by Arab members to the credentials of Israel. At a recent meeting of the World Health Organization, there had been unsuccessful efforts to unseat Israel from the organization and to withdraw from Egypt a regional WHO office. A similar action had been threatened at the annual meeting of the Universal Postal Union in Rio de Janeiro which began just before the 1979 WARC. Many expected a similar controversy at WARC, but no such controversy emerged. There was one political conflict between Israel and the Arabs over a minor allocation issue. On its face the issue was apparently a matter of technical incompatibility between neighboring Israeli and Arab services. Only when one of the Arab administrations demanded an exceptional role call vote, instead of the usual show of cards, was it apparent that the conflict was more than technical. Israel immediately demanded a secret ballot, which provoked a long and acrimonious debate; the ballot finally was taken, and Israel won convincingly. There were no more such tests of strength. *See* ITU-WARC, Minutes of the Eleventh Plenary Meeting, Doc. No. 975, paras. 3.1 to 3.2.19, at 2-4 (Nov. 30, 1979).

[46] Since the Bogotá Declaration (Declaration of the Equatorial States, signed in Bogotá, Dec. 3, 1976, *reprinted in* International Telecommunication Union, Broadcasting Satellite Conference, Doc. No. 81, Annex 4 (Jan. 17, 1977)), several equatorial countries, led by Colombia, have asserted sovereignty over those segments of the geostationary orbit that lie directly above their respective countries. The claim has been raised repeatedly at sessions of the U.N. Outer Space Committee, and it was raised at the 1977 Broadcast Satellite WARC. *See* Gorove, *The Geostationary Orbit: Issues of Law and Policy*, 73 AM. J. INT'L L. 444, 450-59 (1979). At the 1979 WARC, the claim was raised, more or less ritualistically, in the opening plenary session. There was no public debate on the claim until the end of the Conference when Colombia and others submitted two protocol statements on the sovereignty issue. One statement purported to interpret the future space services planning conference resolution to imply recognition of the equatorial sovereignty claim. Allotment planning is fundamentally in conflict with the assertion of any special rights by equatorial countries; the very essence of a plan is to make an "equitable" distribution of the orbit resource to all countries, regardless of where they are located. What Colombia evidently sought was to preserve its options to argue against an allotment plan and to argue that any such plan would be dependent on the consent of equatorial countries to use of their orbit space.

two protocol statements to a Conference resolution calling for a future conference for space services planning. The United States and others attached statements repudiating the Colombian interpretation of the resolution. The second issue was a controversy over election of a Conference chairman. Fortunately, despite some bitterness in the debate, a consensus was reached, allowing the Conference to proceed to duller but more substantive business—although the result may have long-term political implications for ITU leadership.[47]

The Conference made hundreds of decisions in disposing of thousands of individual proposals.[48] I shall not attempt to cata-

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The Colombian protocol statement was submitted not as an original protocol but as a "reply protocol" to which no response normally could be made. Other countries, notably the United States and the United Kingdom, argued that as the statement was not in fact in reply to any original statement, Colombia obviously was attempting to avoid rebuttal of the claim by other countries. The conflict was resolved by compromise allowing the United States and others to include a protocol statement repudiating the Colombian interpretation. *See* ITU-WARC, Final Protocol, Doc. Nos. 942, Protocol 40 (Dec. 3, 1979) & 944, Protocol 75 (Dec. 5, 1979). A summary of the debate is contained in ITU-WARC, Minutes of the Sixteenth and Last Plenary Meeting, Doc. No. 980, para. 2, at 2-4 (Dec. 5, 1979).

[47] The Conference began with a prolonged, and at times bitter, conflict over the selection of chairmen for the Conference and for major committees. Some of the developed countries, especially the United States, the United Kingdom, and New Zealand, were concerned about LDC insistence that the chairman must be from a member of the nonaligned movement (NAM). Only a few weeks earlier, the NAM summit in Havana had adopted a resolution, initiated by India, that the WARC chairmanship should be filled by a nonaligned spokesman. The United States and others saw this as a sign that the NAM intended to use the chairmanship to establish bloc solidarity and to dominate the 1979 WARC and the ITU generally. There was even broader concern that NAM success at WARC would set an undesirable precedent for other U.N. conferences.

The conflict could have been resolved by a vote, in which case the NAM and the Indian candidate probably would have won. ITU tradition dictated, however, that the chairman and officers be elected by consensus. The NAM may have been reluctant to press for a vote at least on the Indian's candidacy, because there was some doubt that he would prevail on a secret ballot. At the same time, the NAM bloc opposed any western candidate, even one from neutral Switzerland. The nonaligned, for their part, were content to withdraw support from the Indian candidate but had great difficulty choosing another. Finally, the nonaligned turned the choice over to the South American delegations nominated an Argentine as a regional candidate. Argentina, although formally nonaligned, is not active in the movement. Most of the western group resisted the NAM demands, but feared that if the issue were forced to a vote, they would lose by a vote so large that the strength of the developing countries would be demonstrated conclusively. The matter finally was settled by a consensus approval of the Argentine as chairman and the Swiss candidate as a special vice-chairman. *See* WARC DELEGATION REPORT, *supra* note 38, at 16-17. Although the election can be viewed as a compromise, it does set a precedent for future NAM claims to leadership positions in the ITU. In retrospect, given the Conference record on political issues, this possibility is not such a concern now as it was then.

[48] These decisions are found in International Telecommunication Union, Final Acts of

logue, let alone review, all of these individual decisions. The vast majority of them are, in any case, of limited, specialized interest. For particular industries or services, many of these specialized decisions doubtless will be important, but that importance is not such as to warrant comment here.[49] I shall limit my sketch—it is no more than that—to a handful of major issues that provided the occasion for the most extensive and excited controversies at the Conference.[50]

In very general terms it is convenient to separate these major controversies into two groups: (1) allocations and regulatory issues involving satellite services above 1 GHz; and (2) those involving terrestrial services in the high frequency (3-30 MHz) region of the spectrum. This grouping is a huge oversimplification even of the allocations and regulatory work of the Conference. It ignores satellite services below 1 GHz; more significantly it ignores terrestrial services in all but a fairly narrow range of the spectrum.[51] Nevertheless this grouping fairly reflects the major areas of greatest global interest and controversy.[52] Many Conference proposals and decisions also involved regional, and even national, allocations,[53]

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the World Administrative Radio Conference (1979) [hereinafter cited as WARC Final Acts].

[49] For a review of these decisions see sources cited in note 39 *supra*.

[50] My review of these issues is necessarily very condensed and therefore also somewhat superficial. It does not attempt to relate the full interaction of all the different participants. My treatment also may be skewed insofar as it is limited to those issues in which the United States had a significant interest. For example, this article does not discuss such issues as the proposal for a planning conference for Europe, the proposal to reallocate frequencies in Africa, the proposal to create a new region in Africa, and revisions made in the 1978 Broadcast Satellite Plans for Regions 1 and 3. As it turns out, however, most of the major controversial issues at WARC involved the United States. Finally, and perhaps needless to say, my official position as chairman of the U.S. delegation may be reason to suspect my views on policy issues. but the factual narrative can be checked against the ITU records of the Conference.

[51] For a breakdown of the spectrum according to major bands and types of services using those bands, see H. LEVIN, THE INVISIBLE RESOURCE 20-21 (1971). For details on how the services in each of these bands were affected by WARC, see generally WARC DELEGATION REPORT, *supra* note 38.

[52] There are many significant issues that are of regional and national concern. The VHF and UHF frequencies, for example, are extremely important in every country; however, the limited propagation of most of the domestic VHF and UHF services confines most of the spectrum management problem to particular regions.

[53] For example, in Region 2, the United States proposed adding fixed and mobile services to be shared with broadcasting throughout most of the 470-960 MHz band. Although the United States was unable to obtain a uniform table of allocations on these services for the entire band, it met its objectives through a combination of table allocations changes and special footnotes. *See* ITU Radio Regulations, *supra* note 19, art. N7/5 & notes 3650B, 3669A, and 3670A. In general, issues presented by such regional proposals were of lesser interest at WARC than those involving worldwide allocations.

for example, the Region 2 12 GHz broadcast satellite issue examined more closely below.

A. *Satellite Communications*

Disputes involving the satellite services were generally the most contentious of the entire Conference. The most notable exception involved remote sensing services on which there was a remarkable, and unexpected, degree of consensus.[54]

The reasons for controversy over satellite communications services are not difficult to discern. In the past 20 years, satellite communications have emerged from the status of an unproved technology to become a central component of modern international and domestic communications systems. The technology and the service are pervasive throughout the world. Through INTELSAT and INTERSPUTNIK, most countries are direct or indirect users of fixed satellite service communications. Many also have domestic satellite service, provided either by domestically owned systems or by special arrangements with INTELSAT.[55]

As important as satellite communications have become for advanced developed countries (particularly those with large territories such as the United States and Canada), they are potentially even more important for emerging Third World countries which lack a terrestrial communications infrastructure on which to develop a modern communications system. For a country like the

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[54] Remote satellite sensing is used to obtain information on land, sea, and atmospheric conditions. The practical and scientific applications are broad, including use in farming, forestry, land and marine resources management, and environmental pollution monitoring. *See generally* NATIONAL ACADEMY OF SCIENCES, REMOTE SENSING FROM SPACE: PROSPECTS FOR DEVELOPING COUNTRIES (1977). While present sensing programs use primarily optical sensing techniques, future sensing satellites will rely heavily on the use of microwave radio frequencies in two ways: passive sensors receiving natural electromagnetic emissions from land, oceans, and atomosphere; and active sensors reading reflections of signals radiated by the satellite. To accommodate both types of operation the United States proposed numerous new frequency allocations with striking success. Particularly noteworthy was the absence of any debate over the political aspects of remote sensing. Whatever the views of many countries on the issue of regulating the dissemination of sensing data, *see* note 11 *supra*, there was at WARC unexpectedly broad support for accommodating remote sensing. I attribute much of this success to the U.S. policy of sharing LANDSAT data. Under an agreement with the National Aeronautics and Space Administration (NASA), several countries operate earth terminals to receive data directly from the satellite. Thus, although LANDSAT is a domestic system, its benefits have been disseminated widely, much like the meteorological satellite systems operated as part of the World Weather Watch under the aegis of the U.N. World Meteorological Organization.

[55] *See* note 1 *supra*.

United States, a domestic satellite system for relaying telecommunications messages from, say, New York to Seattle offers cost and service advantages over a terrestrial network. But the advantages are mostly marginal improvements in an already modern system. By contrast, satellite communications in countries like Brazil or Nigeria, which do not have fully developed terrestrial networks, offer a radical advance in the entire communications system, one which can leapfrog over the present generation of terrestrial relay links to achieve a technological parity with developed countries.

Thus, the development of advanced satellite communications generally will play an important role in any movement towards a new world information order. The international allocation and management of satellite frequencies (and, in the case of geostationary satellites, orbit slots) is, of course, only one part of that development. It is nevertheless a critical part. A scheme of allocations and related regulations governing use is a necessary condition of development. The efficiency of this allocations scheme, moreover, has a direct and important bearing on the cost of system development. For example, an allocations scheme which does not facilitate full exploitation of the spectrum may waste usable frequencies and orbit space and may create congestion in those sectors of each that are used. This congestion, of course, imposes additional costs on users either through degraded service quality, or through increased cost to invest in equipment less susceptible to interference.[56]

If economic efficiency were the sole consideration, the task of developing an optimal allocations scheme would be difficult enough given the many different communications services that must be accommodated in any given portion of the spectrum. This difficulty is compounded by the fact that foreseeable future needs must in general recognize present use, and vice versa. Even within a single country such an accommodation of different uses, over different time periods, proves to be an extraordinarily complicated task.[57]

In international negotiations, however, the difficulty of constructing an efficient set of allocations to accommodate different uses is almost the least problem. Far greater is the problem of accommodating the demands of different nations in varying stages of technological and economic development, not to mention divergent political perspectives. Here, the goal of economic and technological efficiency becomes essentially secondary to the demand for fair and equitable access by all nations to the spectrum and orbit. Doubtless, "fairness," in some sense of the word, is an essential requirement for any global allocation of international resources. As an abstract matter no one disagrees with that proposition, in the ITU or any other international forum. But defining "fairness" in the context of a complex international environment is another matter.

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[56] In broad terms there are two options: to employ new equipment less susceptible to interference; or to move to higher, less congested regions of the spectrum. Either option entails increased investment, increased operating costs, or both.

[57] *See* note 44 *supra*.

WARC was reasonably successful in meeting the different fairness claims as applied to discrete allocations problems, and in most instances it met the demands without unacceptable sacrifice of practical efficiency goals. Many of the most vexing problems of reconciling the competing demands of fairness and efficiency nevertheless were deferred for future conferences.

1. *Fixed-Satellite Service*

Among the different satellite services, the fixed-satellite service, which essentially includes point-to-point telecommunications relay services, posed the most persistently controversial problems of the Conference. Virtually all delegations agreed that the past and projected future growth of international satellite telecommunications traffic alone made it important to secure additional frequency allocations, and projected demands for domestic systems made these needs more urgent. Beyond that general and superficial agreement, however, there was little consensus among the various proposals submitted to the Conference as to where the accommodation should be made.[58] In general terms, the dispute was whether additional allocations could be made below 10 GHz—now extensively used by fixed-satellite and various terrestrial services—or whether they could be accommodated only in higher portions of the spectrum which offered less congestion but substantially increased satellite system costs. Unfortunately, the cost penalty proved largely unavoidable under either option. Additional allocations above 10 GHz would impose costs on new fixed-satellite communications, especially on INTELSAT, whose requirements were the critical element of the controversy. On the other hand, additional allocations below 10 GHz could be made only at the cost of displacing, crowding, or otherwise adversely affecting existing terrestrial services. As one would expect from observing the different levels of national economic development represented at the Conference, the incidence of these respective costs was not uniform. Because the developed countries have disproportionately greater investment in existing terrestrial systems in the below-10 GHz bands than the developing countries, the cost of expanding satellite services into these bands would fall most heavily on them. At the same time, developed countries are, relative to developing countries, better able to bear the greater costs of operating satellites at higher frequencies.

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[58] ITU-WARC, Twenty-Seventh and Twenty-Eighth Reports of Working Group 5D, Doc. No. 722 (Nov. 16, 1979).

For the United States, both terrestrial and satellite services below 10 GHz could be accommodated by a careful selection of certain bands for additional satellite allocations. But it proved impossible to reach a consensus on enough of the U.S. proposed frequencies to accommodate essential downlink requirements.[59] The resulting impasse prompted India, backed by other Third World countries, to demand that a major part of the accommodation for the fixed-satellite service be made by downgrading certain allocations in the 3 GHz band used for vital national and allied defense radar systems by the United States and the United Kingdom.[60] This band long has been shared equally by radars and fixed satellites, but because of assumed incompatibility with the radars, the fixed-satellite service had not been implemented by INTELSAT, as it has been by INTERSPUTNIK. The proposed downgrading would have given radars a secondary status, requiring them to avoid interference with fixed-satellite service.

The proposal was unacceptable to the United States, the United Kingdom, and a number of other allies that had shared defense interests. Notwithstanding that opposition, India was able initially to command a majority in favor of its proposal.[61] The United

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[59] Because a radio communications satellite cannot use the same frequencies to transmit and receive at the same time without interfering with its own message, a certain width of the applicable band must be designated for transmissions from earth to the satellite (the uplink), and another portion of the band employed for transmissions from satellite to earth (the downlink). The Future of Satellite Communications 13 (report of the Twentieth Century Fund Task Force on International Satellite Communications 1970).

[60] ITU-WARC, Twenty-Seventh and Twenty-Eighth Reports of Working Group 5D, Doc. No. 722 (Nov. 16, 1979).

[61] *See* ITU-WARC, Summary Record of the Twentieth Meeting of Committee 5, Doc. No. 955, paras. 1.1.1-.3, at 2 (Nov. 21, 1979). In the working group the United States and its allies had agreed to a provision that urged countries to move radiolocation (radar) out of the

States then declared that it could not accept any decision to downgrade the status of its radar systems, and it would not implement those fixed-satellite frequencies in the United States. In effect, this would foreclose use of those frequencies by INTELSAT because the United States provides a critical part of the traffic which would use them. The United States further declared that it would not protect the fixed-satellite service from radar interference.[62]

This threat had little initial effect on India's proposal. I suspect the reason is that, notwithstanding India's professed objective of helping INTELSAT (a claim which garnered extensive Third World support), India desired the frequencies primarily to accommodate her own future domestic satellite needs. The fact that the United States effectively could foreclose the use of the frequencies to INTELSAT would not impair India's domestic use. Ultimately, however, the other Third World countries supporting India recognized that their interest in providing for INTELSAT could not be forced over steadfast U.S. opposition. At the eleventh hour of the Conference, a U.S. compromise was approved by a coalition of Third World interests led mainly by Jamaica and Brazil, which recognized the continued coexistence of the fixed-satellite and radar allocations until such time as the latter could be relocated.[63] For their part, the United States and other developed countries pledged to take all practicable measures to insure that the fixed-satellite service would be accommodated.[64]

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band when practicable. India, however, insisted on specifying a date by which radiolocation would lose its coequal status—a condition the United States and its allies refused to accept. At the committee level, India's condition was accepted by a close vote.

[62] *Id.* To strengthen its position, the United States also applied these conditions to the use of another frequency band, 4500-4800 MHz, which was proposed to be used in conjunction with the 3400-3600 MHz band for the fixed satellite service. *Id.* para. 1.3.4.2, at 5. It is the satellites, not the radars, which stand to suffer interference when the two share frequency bands.

[63] ITU-WARC, Minutes of the Eleventh Plenary Meeting, Doc. No. 975, paras. 5.3.1-.12, at 9-10 (Nov. 30, 1979). The compromise proposal, introduced by Jamica, essentially reinstated the original U.S. proposed compromise that had been reached in the working group but rejected in committee. *See* note 61 *supra*. The Jamaican proposal is contained in ITU-WARC, Allocations to the Fixed-Satellite Service in the Bands 3.4-3.6 GHz and 4.5-4.8 GHz, Doc. No. 880 (Rev. 1) (Nov. 30, 1979). India finally withdrew its insistence on a specific date for reducing radiolocation to a secondary status, and the compromise was adopted by consensus. *See* ITU-WARC, Summary Record of the Twentieth Meeting of Committee 5, Doc. No. 955 (Nov. 21, 1979).

[64] ITU-WARC, Summary Record of the Twentieth Meeting of Committee 5, Doc. No. 955 (Nov. 21, 1979).

2. *Feeder Links*

Closely parallel to the controversy over additional allocations for fixed satellites was a problem of identifying uplink frequencies to "feed" the broadcast satellite device at 12 GHz. The 1977 Broadcast Satellite Conference had developed for ITU Regions 1 and 3 an allotment plan for broadcast satellites operating in this frequency segment.[65] The 1977 plan covered only downlinks and not uplinks or so-called "feeder links." Because feeder links are included within the fixed-satellite service, any fixed-satellite allocation can be used. It is not necessary to designate feeder link frequencies. Nevertheless, many countries, especially those in the Third World, were apprehensive that unless specific bands were designated and planned for this purpose, there would not be adequate frequencies to accommodate the broadcast-satellite service planned in 1977. Countries that already had undertaken investments in developing direct broadcast-satellite service, on the strength of the 1977 conference, were particularly concerned. Virtually the entire ITU membership shared an interest in insuring that adequate, suitable spectrum was available for broadcast satellite "feeder links." The United States, though generally unenthusiastic about satellite frequency planning, nevertheless accepted the desirability of some designation or even a specific allotment plan for feeder links. As in the case of the fixed-satellite service the dispute centered on which frequencies to set aside.

Again the United States and other developed countries found themselves in a confrontation with Third World countries, led primarily by India, over a proposal to place the feeder links in the 14.5-15.35 GHz band. These links were intended to be shared on a primary basis with terrestrial fixed and mobile services.[66] The United States and a number of allies, preferring an allocation in the 17 GHz range, vigorously objected to sharing the 14.5-15.35 GHz band, particularly in the upper portion where they used present allocations for critical defense purposes.[67] In addition, the Soviet Union opposed the Third World Proposal because its current uses would be incompatible with the proposed new feeder links.[68]

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[65] *See* WARC Final Acts, *supra* note 48, app. 29A; ITU Radio Regulations, *supra* note 19, art. N13/9A. Region 2 opted to postpone adoption of a plan until a future conference now slated for 1983.

[66] ITU-WARC, Twenty-Sixth Report of Working Group 5D, Doc. No. 711 (Nov. 16, 1979).

[67] *Id.*

The controversy over feeder links was sharp and prolonged. Once again a settlement was reached despite the threat of a major North-South political division. The Conference ultimately accepted a U.S.-initiated compromise which provided for use of several bands for uplinks at the option of individual administrations and for a future allotment plan to be developed by future conferences.[69]

In both the fixed-satellite and feeder-link controversies the basic problem was not principally a matter of conflict between the respective requirements of developed and developing countries. All requirements were essentially the same, even though there were differences as to how best to meet these requirements. But, in reviewing the alternatives for doing so, what is striking is the fierce resistance by the developing countries to considering those alternatives which would not disrupt important present operations by the developed countries—not only the United States and its allies, but in the case of feeder links, the Soviet Union as well. By contrast, many Third World countries opposed any changes in HF frequency allocations which might have even slight impact on their existing services.[70] In part, this situation reflects the belief prevalent among many of the Third World countries that claims of economic impact on developed countries, especially the United States, could not be credited, but were either exaggerated or irrelevant.

The United States often faced this credibility problem, and nearly all the developed countries, including the Soviet Union, confronted it occasionally. Seldom could the problem be met by appeal to factual evidence or logical argument.[71] In the end, these controversies typically were settled only when the developing countries realized that the United States and other countries were in a position to block effective use of the proposed allocations unless their existing services were accommodated.

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[68] *Id.*

[69] *See* ITU Radio Regulations, *supra* note 19, art. N7/5 (allocations and accompanying notes for the frequencies 10.7-11.7 GHz, 14.0-14.8 GHz, and 17.3-18.1 GHz); ITU-WARC, Minutes of the Twelfth Plenary Meeting, Doc. No. 976, paras. 2.6-.13, at 5-9 (Dec. 1, 1979); ITU-WARC, Minutes of the Eleventh Plenary Meeting, Doc. No. 975, para. 5.22, at 16-18 (Nov. 30, 1979). *See also* WARC Final Acts, *supra* note 48, Res. BQ & CH (future allotment planning for feeder links).

[70] *See* text at notes 89-102 *infra*.

[71] In fairness to the Third World, seldom did technical evidence or logic speak unambiguously on the issues. Even where no evidence was offered in rebuttal of developed country claims, there could be a question of whether the data were reliable, or whether the analysis was complete.

3. *Changes in the 12 GHz Band*

Of all the satellite allocations controversies, perhaps the most frustrating to the United States was that surrounding its proposal to change existing Region 2 allocations for the broadcast and fixed-satellite allocations in the 12 GHz range of the spectrum. In Region 2, broadcast and fixed-satellite service shared the 12 GHz band, and there was evident concern among South American countries that extensive implementation of the fixed-satellite service might foreclose opportunities for broadcast service. Accordingly, an interim arc segmentation plan was adopted which gave separate orbit segments to each service.[72] Subsequently, it was discovered that this segmentation plan put severe and unnecessary constraints on the number of satellites, in both services, that could use the arc. The effect of such a constraint was especially severe on the United States inasmuch as its "open skies" policy commits it to multiple competitive entry in the domestic satellite field.[73] The United States proposed to expand the 12 GHz band and divide it into separate frequency segments—11.7-12.2 GHz for fixed satellites and 12.2-12.7 for broadcast satellites.[74] This would open up the entire Region 2 portion of the arc to each service and provide 500 MHz of spectrum to each service.

Before the Conference began, the United States discussed its proposal extensively with Canada and Latin American countries. Canada opposed the proposal, at first arguing that the U.S. proposal would interfere with Canada's planned terrestrial microwave system. The United States demonstrated that there would be no significant conflict with such a system. Canada next argued that the U.S. proposal would preclude Canadian operation of a hybrid satellite system operating in both the fixed and broadcast services. When it was pointed out that the 1977 arc segmentation scheme also would preclude such operation, Canada argued essentially that the whole allocation question should be put off until 1983 in order to study other options. In the months before the Conference, both the United States and Canada lobbied the Latin Americans for support of their respective positions.

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[72] International Telecommunication Union, Final Acts of the World Broadcasting-Satellite Administrative Radio Conference (1977).

[73] *See In re* Establishment of Domestic Communications-Satellite Facilities by Non-governmental Entities, 35 F.C.C.2d 844 (1972).

[74] The U.S. proposal is contained in ITU-WARC, Proposals for the Work of the Conference, Allocation Table in the Bands 1215 MHz 40 GHz, Doc. No. 45 (Jan. 31, 1979).

Going into the Conference the countries of Region 2 were split. Brazil and Chile agreed with the U.S. proposal; Venezuela, Argentina, and Mexico sided with Canada; and others were undecided.[75] A round of talks among the United States, Canada, and Brazil went nowhere for the first few weeks. Finally, a compromise among the three was struck which, in essence, divided the band in two as the United States proposed but provided hybrid systems special limited access to the two separate bands. When the compromise was put to the rest of the Region, however, most Latin American countries other than Brazil were reluctant to accept it without adding their own individual ideas. They proposed, accordingly, to reserve a 200 MHz segment in the middle of the band (12.1-12.3 GHz) for continued use by both services until the 1983 Conference, when a final division would be made. Though the technical or economic basis for such a postponement was never very well demonstrated, it was accepted and the issue resolved.[76]

Although the issue was almost entirely an intraregional controversy[77] it had some of the same elements of North-South tension as the other two fixed-satellite controversies. Whatever the technical merits of Canada's objection to the first U.S. proposal, the controversy boiled down to a matter of political trust. The reason Canada was able to obtain the support of many Latin American countries was not a shared interest in hybrid satellites, but a shared apprehension that somehow the U.S. proposal would enable the United States to exploit the 12 GHz band before the Region could develop a specific allotment plan to protect the interests of all countries. Despite a demonstration that the U.S. proposal could increase by as much as three times the usable arc segment, which would redound to the benefit of *all* Region 2 countries, many were skeptical of U.S. motives and seized on Canada's technical objection as a basis for advocating a postponement. Interestingly, when the United States, Canada, and Brazil presented a joint compromise, the majority of Latin American countries still resisted. A "solution" by the three major Region 2 "developed"[78] countries was almost as suspicious as one by the United States alone. At least for political reasons, the other Latin countries considered it essential to require still another compromise between "North" and "South."

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[75] There is little public record of the debate because virtually all of the discussion took place outside any meeting for which a report was made, other than the report of the final result. *See* ITU-WARC, Report of Region 2 ad hoc Group, Doc. No. 584 (Rev.1) (Nov. 12, 1979).

[76] *See* ITU Radio Regulations, *supra* note 19, art. N7/5 (allocations for 12 GHz); WARC Final Acts, *supra* note 48, Res. CH.

[77] There were minor but difficult questions on how to guarantee that there would be no interregional interference arising from the differences in service allocations between Region 2 and Regions 1 and 3.

4. *Planning of Space Services*

As expected, there was very broad support among developing countries for planning of the geostationary arc and frequencies allocated for some space services, particularly the fixed-satellite service. They supported such planning largely out of fear that developed countries were preempting the orbital positions and frequencies and consequently emerging needs would not be met under present ad hoc assignment procedures. The developing countries were divided, however, as to what services or which particular frequencies should be planned. For example, the People's Republic of China proposed that only new allocations to fixed-satellite service below 10 GHz should be planned.[79] India proposed that all fixed-satellite allocations, including allocations used for feeder links, should be planned.[80] Iraq went one step further and proposed that *all* space services be planned.[81]

The United States supported planning of the feeder links and accepted the decision taken at the 1977 Broadcast Satellite Conference to plan the broadcast satellite service at 12 GHz.[82] Nevertheless, the United States and many other developed countries opposed the concept of a detailed orbital position and frequency allotment plan for the other services, arguing that such detailed plans were unnecessary to insure equitable access to frequencies and space positions and instead would lead to inefficient use of these resources.[83] The clash of these two views at the Conference was prolonged and intense, though interestingly, the point of debate seemed to be a matter of administrative detail: the scope of the agenda of a future "planning" conference. Though the United States did not *in general* support "a priori" planning, it did not object to a future conference to consider feasibility and various planning options.[84] It argued, therefore, for an open-ended agenda which would not predetermine the issue. Proponents of planning sought the opposite. The resolution which finally emerged, calling for a future conference, was not completely satisfactory to the United States.[85] However, in the end the United States was alone in seeking to modify the resolution, and there seemed no point in holding out further by taking a reservation on the issue. Based on the debate about the agenda, the outcome of the future planning conference is likely to turn less on the technical merits and demerits of planning than on the political trust of developing countries in a scheme of resource allocation which they did not design and which many do not yet fully understand.

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[78] Brazil generally has eschewed a leadership role among Third World countries, no doubt in part because Brazil's level and rate of economic development often align its interests with those of developed countries. *See* Fishlow, *Flying Down to Rio: Perspectives on U.S.-Brazil Relations*, 57 FOREIGN AFF. 387 (1978).

[79] ITU-WARC, People's Republic of China, Proposals for the Work of the Conference, Doc. No. 78 (Sept. 18, 1979).

[80] ITU-WARC, India, Proposals for the Work of the Conference, Doc. No. 93 (Oct. 13, 1979).

[81] ITU-WARC, Iraq, Draft Resolution Relating to Planning the Radiocommunication Satellite Services Using the Geostationary Orbit, Doc. No. 359 (Oct. 25, 1979).

[82] On feeder links, see note 59 *supra*; on 12 GHz, see note 76 *supra*.

B. *High Frequency Communications*

Technological advances have opened up extremely high microwave frequency ranges for some uses such as satellite communications. Such advances, however, have not diminished the world demand for frequencies in the lower portions of the spectrum, most notably those frequencies which are anachronistically still labeled "high" frequencies, or "HF."

HF is used for a wide variety of different communications services including aeronautical, amateur, broadcasting, fixed, and maritime-mobile. Virtually every country, whether developed or developing, depends heavily on HF to support one or more of these services. In addition, virtually all of the HF terrestrial services have important international applications or effects.[86] Hence, international agreement on HF allocation and use is critical.

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[83] *See* WARC DELEGATION REPORT, *supra* note 38, at 76-79; ITU-WARC, First Report of Ad Hoc Group 2 to Committee 6, Doc. No. 482 (Nov. 5, 1979); ITU-WARC, Final Report of Ad Hoc Group 2 to Committee 6, Doc. No. 678 (Nov. 15, 1979).

[84] ITU-WARC, Minutes of the Thirteenth Plenary Meeting, Doc. No. 977, para. 8.2.1, at 5 (Dec. 2, 1979).

[85] *See id.*; WARC Final Acts, *supra* note 48, Res. BP. The resolution directs the Conference to "decide which space services and frequency bands should be planned." *Id.*

[86] *See* note 3 *supra*.

The principal controversy at WARC centered around competing frequency demands to accommodate three services: broadcasting, fixed, and maritime-mobile. Competition between the first two represented the essential controversy over the HF band as a whole.

The United States sought a major increase in broadcasting allocations in order to accommodate the demands of its international broadcasting operations, such as Voice of America, Radio Free Europe, and Radio Liberty.[87] Other developed, and many developing, countries also sought substantial increases—though not all of equal magnitude—to support comparable operations.[88] It quickly became apparent that the increases sought by the United States and a few other countries were unrealistically ambitious, particularly insofar as they were proposed to be accommodated in the highly congested lower portions of the HF band. The difficulty lay in the fact that such increases could, as a practical matter, be accommodated only by displacement of the fixed service which is used extensively, especially in developing countries, for basic telecommunications relay service.[89] Such use clearly will diminish in the future as terrestrial and satellite microwave facilities are put into use. Nevertheless, many countries, especially in Latin America, were unwilling to anticipate such future changes or to accept any sacrifice now or in the immediate future in HF fixed allocations.[90] A compromise finally was struck which provided for modest increases in broadcasting allocations in the future, subject to the condition that assignment procedures be modified in certain respects, and that an

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87. ITU-WARC, U.S. Proposals for the Work of the Conference, Allocation Table in the Bands Below 27.5 MHz, Doc. No. 43 (Apr. 2, 1979).

88. *See, e.g.*, ITU-WARC, United Kingdom, Proposals for the Work of the Conference, Doc. No. 53A (Feb. 1, 1979); ITU-WARC, Pakistan, Proposals for the Work of the Conference, Doc. No. 55 (Feb. 1, 1979).

89. Although this is the dominant use, HF fixed-service frequencies also are used extensively, even in developed countries, as backup to more advanced systems. HF fixed-service frequencies are used extensively by the United States in military systems overseas for mobile communication, on condition of noninterference with fixed-service users. This extensive military use was a principal reason for a pre-WARC conflict within the United States between the Department of Defense and broadcasters—the latter seeking and the former resisting substantial changes in HF allocations from the fixed service to the broadcasting service. A prolonged contest was resolved essentially in favor of the broadcasters, but the increases actually obtained at WARC were of the same order as originally had been accepted by the Department of Defense.

90. *See* ITU-WARC, Third Report of Working Group 5BB, Doc. No. 644 (Nov. 13, 1979). The lineup of countries on the question of significant broadcast expansion is illustrated by the roll call votes on increases in the 6 and 7 MHz bands. *See* ITU-WARC, Minutes of the Ninth Plenary Meeting, Doc. No. 973, para. 6.555.5, at 16 (Nov. 28, 1979).

HF broadcast plan be developed at a future conference. The United States and other proponents of broadcasting still pressed hard for additional accommodation in two critically important bands below 10 MHz--the 6 and 7 MHz bands.[91] The United States lost the effort by fairly narrow vote margins. Failing to obtain additional frequencies in these bands, the United States reserved the right to use these bands if the failure to make additional broadcast allocations were not remedied at the future broadcasting conference.[92]

The conditions imposed on increased broadcasting allocations reflect the pervasive concern of developing countries that current procedures for handling frequency assignments are essentially "first-come, first-served"[93] and thus favor the interests of those countries having more developed communications systems and, hence, more mature demand for frequencies. As in the area of space services, these concerns reflect some dubious conceptions about how the assignment scheme actually operates. The misconception is particularly evident in the case of the proposed broadcasting plan which a future broadcasting conference will be asked to construct. The United States, along with many other countries, accepted in principle a future HF broadcasting plan designed to allay Third World concerns of inequity in present allocations. But in fact any "inequity" that exists is purely a function of larger social and economic disparities among broadcasting countries and not of any ITU mechanism. Certainly this is the case in international HF broadcasting, where assignments are made only after coordination of operational schedules.[94] There is no first-come, first-served priority based on date of registration. In effect, the present procedure is roughly equivalent to a short-term plan.[95] Developing countries have experienced difficulty in finding frequencies available to support increased broadcasting operations, but that difficulty is shared by developed countries as well. If it is a fact that developed countries have a larger number of broadcasting assignments than developing countries, it is also a fact that they have more extensive operations. In any case, there is no *procedural* impediment to increased assignments for developing countries. Under the present rules, any country can ask for those frequencies necessary to support its quarterly schedule of operations and can demand that others coordinate with it to eliminate interference conflicts. Countries are constrained from obtaining more assignments only to the extent that overall limits on the amount of bandwidth allocated to the service must be accepted in order to avoid undue congestion. In other words, the problem with the present scheme is not that it is first-come, first-served, but that it is "everyone-come, everyone-served" until the band becomes overcrowded.

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[91] *See* ITU-WARC, Minutes of the Ninth Plenary Meeting, Doc. No. 973 (Nov. 28, 1979).

[92] ITU-WARC, Final Protocol, Doc. No. 942, Protocol 38 (Dec. 3, 1979).

[93] *See* text at notes 31-35 *supra*.

[94] *See* text at note 36 *supra*.

[95] *See* D. LEIVE, *supra* note 17, at 179-81. The present broadcasting procedure, unchanged by the 1979 WARC, was developed in 1959 after efforts to develop a long-term plan failed.

Of course, within the allocations constraints that exist, a broadcast plan might attempt a more egalitarian distribution of frequencies among countries. At least some Third World proponents of a future HF broadcast plan clearly see that as its ultimate objective. Such a plan presumably would set a fixed upper limit on the level of congestion, then ration the frequencies among users on the basis of some "equitable" formula.

Whether or not such a plan can be practically devised, it is unlikely to be acceptable to major international broadcasters unless there is enough further increase in broadcasting allocations to meet minimum projected demands over the next twenty years. The United States and other major proponents of increased broadcast allocations emphasized this point at the Conference. A plan which attempts merely to redistribute existing, or slightly augmented, allocations is not acceptable.[96]

A detailed assignment plan was not the only means suggested at the Conference for redistributing frequency assignments. Algeria proposed a scheme for HF fixed-service assignments which would give to developing countries priority use of seventy percent of the HF allocations for each service.[97] The proposal represented a "solution" to a problem that had been misunderstood. Algeria and some other developing countries, especially in Africa, evidently have been unable to locate sufficient HF frequencies to meet current fixed-service needs because of the extensive use, or at least prior registration of assignments, by other countries. By the imperative of popular Third World claims that the developed countries have monopolized the spectrum generally, it was inferred in this case that there was a maldistribution of HF fixed frequencies—hence the Algerian proposal.

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[96] The position of the United States and major proponents of broadcast allocations increases is reflected in the statement of the United Kingdom, summarized in ITU-WARC, Minutes of the Ninth Plenary Meeting, Doc. No. 973, para. 6.51.1, at 15 (Dec. 7, 1979), and in the statement of Pakistan quoted in ITU-WARC, Summary Record of the Twenty-Third Meeting of Committee 5, Doc. No. 958, para. 4.4.1, at 5 (Nov. 23, 1979). *See also* ITU-WARC, Final Protocol, Doc. No. 942, Protocol 38 (Dec. 3, 1979).

[97] ITU-WARC, Algeria, Proposals for the Work of the Conference, Doc. No. 119 (June 18, 1979).

For the United States, as for many countries, the issue was more a matter of principle and precedent than of immediate impact. The measure would have affected U.S. HF fixed-service requirements slightly, if at all,[98] but once recognized, such a measure could be applied to virtually every service and every part of the spectrum. For example, many developed countries saw it as only a short step from the Algerian proposal to schemes for setting aside certain fixed-satellite frequencies and orbital positions for developing countries.

Interestingly, the Algerian proposal was not warmly received by many developing countries despite its ostensible purpose of giving them priority *vis-à-vis* developed countries. Undoubtedly many saw the practical as well as political difficulties with the proposal.[99] In addition, many could see that Third World access to HF fixed frequencies is not impeded so much by use in developed countries as by competition among developing countries. The technical reason is elementary: The typical low-power HF fixed-service has a limited range; hence, the potential for interference exists usually between closely proximate countries, which means conflicts between developing countries themselves rather than between developing and developed. Thus, while U.S. domestic use of HF fixed frequencies does not preclude Algeria's use of the same frequencies, Tunisia's use of HF frequencies clearly does.

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[98] Most of U.S. HF fixed-service requirements are for overseas military operations, *see* note 90 *supra*, for which assignments are made by cooperative governments in the area of use. Frequently these are developing countries which would receive favorable treatment under the Algerian proposal. Given their limited propagation, fixed-service frequencies within the United States would conflict with few, if any, developing countries.

[99] For one thing, there is no single accepted definition of "developing country." For another, the Algerian proposal provided no basis for establishing priorities *among* developing countries, that is, among most countries of the world. Given that the economic and technological differences among developing countries are as great as between many developing and developed countries, the Algerian proposal would achieve very little real "equity." In fact, it almost certainly would lead to attempts to subdivide developing countries according to economic or technological status. I think this was foreseen by some of the relatively more developed countries of the Third World, and it partly explains their lack of enthusiasm for the Algerian proposal.

In this respect, it is also noteworthy that, contrary to popular Third World rhetoric,[100] it is the developing, not developed, countries that dominate HF fixed-frequency assignments.[101] Thus the factual base for any wholesale redistribution of fixed-service assignments was lacking. There was nevertheless a consensus that some measures should be taken to ease the difficulties which countries such as Algeria had experienced in meeting their requirements. The Conference adopted a series of measures to meet these needs. For example, it empowered the IFRB to provide special assistance to developing countries in selecting and registering frequencies, and it gave special recognition to HF fixed-service allocations in cases where alternative communications facilities are not available.[102]

IV. THE ITU AFTER WARC

Before the 1979 Conference it was commonplace that the ITU today is not what it was twenty years ago. No doubt this is true. The new majority of Third World countries clearly has changed the former hegemony exercised by a handful of developed countries. But what that implies in the way of other changes in the ITU and its business is unclear. The 1979 WARC provides a few clues on which to base some cautious speculation.

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[100] Third World spokesmen frequently assert that the developed countries control ninety percent of the radio spectrum. *See, e.g.*, M. MASMOUDI, THE NEW WORLD INFORMATION ORDER (UNESCO International Commission for the Study of Communication Problems, Report No. 31, 1978). The claim is general, but it is applied often to the fixed service in particular. So far as I am aware the evidentiary basis for this statement has never been identified, let alone verified. It is not even apparent what the unit of measurement is—bandwidth, number of assignments, transmitters, etc. In any event, the slogan is quite meaningless on any reference unit insofar as it incorrectly implies that use of particular frequencies is exclusive to a single user and that, therefore, frequency allocation is a zero-sum problem. Even the most casual acquaintance with the way in which the radio spectrum is allocated and used should be sufficient to show this is not the case. Nevertheless, through constant repetition, the slogan has gained a degree of acceptance even among those who should know better. *See, e.g.*, Hudson, *The U.S. Faces WARC: Implications for Development Communications*, J. COM., Winter 1979, at 179, 180.

[101] An informal analysis by the U.S. delegation of HF frequency registrations shows that only three developed countries, the Soviet Union, the United States, and Canada, are among the ten countries having the most assignments. Among the top five, only the Soviet Union falls in the category of developed countries.

[102] *See* ITU Radio Regulations, *supra* note 19, art. N12/9. The key provisions are Nos. 4280A, 4326A-4326M, and 4439.

A. *The Politics of the No Longer Silent Majority*

To begin with, it is important to emphasize that the change in ITU membership has not substantially altered the essentially technical character of the ITU. WARC negotiations largely were contained within the framework prescribed by a technical agenda, which ensured that political considerations, though not absent, at least were filtered for relevance. The willingness to forego broad, abstract political objectives is evident in the character of the delegations sent to Geneva. Virtually every major delegation at the WARC was composed of and led by technical representatives from each country's telecommunications ministry and associated organizations. The United States was exceptional in having its delegation headed by a foreign ministry representative and in sending a cadre of foreign ministry delegates to attend to purely "political" issues.[103]

Perhaps more important than the professional background of delegates to ITU conferences is the continuity of individual representation within the respective delegations. It used to be said that the ITU was an "old boys' club." Judging from the 1979 WARC, it remains so. Virtually all of the active delegations, including those from new ITU members, had extensive prior experience in ITU activities. Many of the same key representatives are expected to be active in future ITU conferences. If so, it is unlikely that the future will witness any radical departures from the pattern of negotiations in the 1979 WARC. Of course, we can expect to see increasingly influential Third World participation in the ITU. Nevertheless, I would not expect to see an overpowering Third World dominance for two reasons.

First, the developing countries are not a consistently unified bloc in the ITU any more than in any other international forum. Indeed, the potential for unified action is probably less in the context of ITU negotiations than in other U.N. forums because the ITU engages less in generalized political discourse, on which it is easier to develop a united position, than in the pursuit of specific economic or social objectives, where detailed negotiations quickly expose underlying differences. There may be as much divergence of social and economic interests among developing countries as there is between many developing and developed countries.

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[103] For a list of the U.S. delegates, see ITU-WARC, List of Participants, Doc. No. 982, at 28-31 (Feb. 1, 1980).

Second, power in international institutions is not a simple matter of majority vote. Many ITU observers have been troubled by the prospect of interests of the United States and other developed countries being jeopardized by the overwhelming voting power of developing countries in the ITU,[104] even though any ITU member may withhold its consent to any majority decision by entering an appropriate "reservation" in the final acts.[105] The effect of such a reservation leaves the country free to pursue its own use of the spectrum independent of other countries, but it does not give it the international recognition or protection which may be necessary for effective utilization of the frequencies. The prerogative of unilateral action is, however, an effective lever against majority control where a particular country needs no such protection or recognition to operate the stations in question. As a small example, at the WARC a majority of countries insisted on adding a requirement that in certain specified bands, mobile-satellite stations must operate on a noninterference basis with stations of other services sharing the allocation.[106] All of the NATO countries, which use these bands for a common mobile-satellite defense system, simply refused to accept the noninterference condition.[107] Presumably the majority then could have voted to deny the allocation to the mobile-satellite service, but that only would have provoked another reservation of the right to operate unilaterally which, in the circumstances, the NATO countries could do since they did not require protection from other services.

Moreover, there are other levers which strong countries can exercise to protect their interests against a majority. The controversy over fixed-satellite allocations, and the attempted displacement of U.S. and U.K radar systems in the 3 GHz band is illustrative.[108] Once the practical consequences of forcing a decision over, in particular, U.S. opposition were pointed out by a small group of astute Third World delegates, the wisdom of a compromise settlement was perceived. The important point, however, is that the practical benefits of a consensus were recognized and were not foregone simply to record an ideological victory for the developing countries.

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[104] *See* Branscomb, *supra* note 41, at 143-44.

[105] International Telecommunication Convention, Oct. 25, 1973, art. 77, para. 513, 28 U.S.T. 2497, T.I.A.S. No. 8572 (*entered into force* Apr. 7, 1976).

[106] *See* ITU Regulations, *supra* note 19, art. N7/5 No. 3618.

[107] ITU-WARC, Final Protocol, Doc. No. 942, Protocol 32 (Dec. 3, 1979).

[108] *See* text at notes 61-64 *supra*.

Despite the benign record of the Conference in terms of North-South politics, some observers have warned that this is deceptive as a guide to the future, since many of the most politically volatile issues were deferred to subsequent conferences.[109] The plenipotentiary conference, scheduled for 1982, will provide the first important occasion for an overtly political debate. In contrast to administrative conferences, the plenipotentiary does not have a technical agenda, but is concerned with more general political matters such as reviewing the basic charter of the ITU and electing the major officers. Because there are no technical issues of spectrum allocation and usage to be resolved, one can expect that this conference will give fairly free rein to general political discourse and rhetoric. One occasion likely to excite political controversy will be the election of a chairman. Based on the experience at the 1979 Conference, this election will be hotly contested.[110]

Apart from the important question of ITU leadership, the plenipotentiary conference almost certainly will examine institutional roles within the ITU. In particular the Third World probably will seek ways to strengthen the powers of the IFRB. This is in part a natural reflection of organizational function: Every country must look to the IFRB for assistance in registering and coordinating the use of frequencies.[111] Third World interest in the IFRB also reflects a belief that the IFRB and its staff are more sympathetic to, as well as more aware of, developing country interests. Particularly if the Secretary-General elected in 1982 is identified only weakly with developing country interests, the IFRB will grow in power. The 1979 WARC gave indications of the growth of power and influence of the IFRB.[112]

In contrast, the influence of the CCIR may diminish. The 1979 WARC showed that many of the Third World countries believe the CCIR is dominated by developed countries and has been used by them to dominate the ITU. The complaint reflects the fact that many developing countries lack sufficient technical expertise to participate fully and effectively in the CCIR. Although the Conference recommended numerous tasks for the CCIR,[113] it was reluctant to entrust the CCIR with major responsibility for making recommendations on important, politically controversial issues.[114]

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[109] *See Why the sky didn't fall at WARC*, BROADCASTING, Dec. 17, 1979, at 44, 52.

[110] *See* note 47 *supra*. I doubt that the contest over the chairmanship will be drawn simply along North-South lines. Developed countries probably will not dispute that the ITU chairman should come from a developing country; the question will be, which one? The choice is as likely to divide the developing countries as it is to separate them from the developed.

[111] *See* notes 25-26 *supra* & accompanying text.

[112] One noteworthy example is the expansion of the IFRB's role in aiding developing countries to select frequencies and register assignments. *See* note 102 *supra* & accompanying text. Another important new role is to provide assistance in preparing for and organizing future conferences. *See* WARC DELEGATION REPORT, *supra* note 38, at 95-96.

The United States has every reason to support a stronger IFRB which has the trust of the Third World and which therefore can exert a positive influence in resolving interference conflicts and in promoting accommodation of interests among ITU countries. The United States supported measures taken at the 1979 WARC to expand the IFRB role in assisting developing countries in locating and registering frequencies. The United States could support even further expansion of this IFRB assistance role. Technical assistance by the IFRB, however, is only a partial answer to the more general problem, faced in all international negotiations, of providing technical and economic assistance for developing countries.

B. *Technical and Development Assistance*

For many years, the ITU has operated a relatively modest technical assistance program in coordination with the U.N. Development Programme.[115] The issue of expanded technical assistance was raised at the WARC, but it did not occupy a prominent place in Conference deliberations. Consistent with the WARC deliberations generally, the discussion of assistance was quite narrowly focused on spectrum management and other matters that were part of the Conference agenda. The result was a series of resolutions calling for establishment of specialized technical assistance.[116] Unlike debates in other forums over the new international economic order, there was little discussion of general principles of international development assistance. For example, contrary to U.S. expectations, there was no carryover into WARC from the U.N. Conference on Science and Technology for Development, held in Vienna a month before WARC began.[117] Similarly there was little apparent fallout from the general, often diffuse discussions about development assistance as part of the new world information order.

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[113] *See id.* at 96. The recommended CCIR studies run the gamut of subjects from the study of climatic zones for purposes of calculating propagation to transmission of electric power from a solar power satellite.

[114] For example, the IFRB was chosen to carry out the technical preparations for the important and controversial future space services planning conference. *See* note 112 *supra*. The CCIR is directed to carry out preparatory studies and to provide the conference with technical information, but the IFRB expressly was given the main responsibility. Otherwise, the developed countries, through the CCIR, might have created a bias in the outcome by introducing technical reasons why planning was not feasible.

[115] *See* INTERNATIONAL TELECOMMUNICATION UNION-UNITED NATIONS DEVELOPMENT PROGRAMME, TELECOMMUNICATION AND DEVELOPMENT (Booklet No. 22, 1978).

[116] The Conference adopted some fifteen resolutions and recommendations endorsing technical cooperation and assistance in various areas. Almost all of them deal with highly specific technical subjects relating to radio frequency usage and management. The following are illustrative: WARC Final Acts, *supra* note 48, Res. AD (development of National Radio

The failure of WARC to develop a broad concept of general assistance in the field of communications, and the relatively low priority given to the subject generally, doubtless will disappoint those proponents of greater assistance who hoped WARC would provide the occasion for drawing greater international and U.S. domestic attention to this area. For the United States, however, it is probably fortunate that the Third World did not seek a more ambitious commitment of assistance. While the United States supported the resolutions calling for particular programs, to be supported from UNDP or other voluntary funds, it has been chary about committing any large sum of funds to communications assistance either on a bilateral or multilateral basis.[118] Indeed, it has been the source of

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Frequency Management), Res. BZ (assistance to developing countries in securing access to HF bands for fixed services), and Res. CG (technical cooperation in study of propagation in tropical zone). A complete list is provided in WARC Final Acts, *supra* note 48.

None of the resolutions and recommendations establish any financial commitment to the projects. In general, most of the funding for ITU technical assistance is provided by UNDP, which appropriates such funds only after it has approved the specific project plans submitted by the country requesting assistance. *See* INTERNATIONAL TELECOMMUNICATION UNION-UNITED NATIONS DEVELOPMENT PROGRAMME, *supra* note 115, at 34-40.

[117] The Deputy Secretary-General of ITU had attended that Conference and had discussed the importance of the ITU's satellite communications activities to the Programme of Action of the Conference. *See* Report of the U.N. Conference on Science and Technology for Development, U.N. Doc. A/CONF.81/16/Corr.1 (1979).

[118] U.S. policy has been to channel multilateral technical assistance through the UNDP, to which contributions are voluntary, rather than through the U.N. specialized agencies which are supported by payments assessed to all members according to a prescribed formula. In exceptional cases, however, the United States has supported technical assistance by the specialized agencies where it is tied closely to their operational mission. *See Authorizing Appropriations for Fiscal Years 1980-81 for the Department of State, the International Communication Agency, and the Board for International Broadcasting: Hearings Before the Subcomm. on International Operations of the House Comm. on Foreign Affairs*, 96th Cong., 1st Sess. 67-68 (1979) (statement of C. William Maynes, Assistant Secretary of State for International Organization Affairs). In authorizing appropriations for 1979, Congress, on the initiative of Senator Jesse Helms (R.-N.C.), directed that U.S. dues payments to the United Nations and its specialized agencies should not be used to fund technical assistance. The United States thereupon was obliged to seek assurance from the United Nations and its agencies that no part of U.S. dues would be so used. Failing to obtain such

some embarrassment that the United States in the past has been looser with its promises than with its purse strings.[119]

In preparing U.S. positions for WARC, and for earlier UNESCO and U.N. discussions of the new world information order, an effort has been made to develop a more ambitious and coherent program of economic and technical assistance in the field of communications and information activity, including, but not limited to, activities related to the use of radio spectrum. The result of these efforts, though perhaps not negligible, was altogether modest.[120]

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assurance, the United States was forced to withhold payment of U.N. dues—a cause for some embarrassment on the eve of the 1979 WARC, where the issue of assistance was expected to be raised. *See id.* at 74-82. Fortunately, the fiscal 1979 stricture was not carried forward to future appropriations and was repealed for fiscal years 1980 and 1981. Department of State Authorization Act, Fiscal Years 1980 and 1981, Pub. L. No. 96-60, § 110, 93 Stat. 395 (1979).

[119] A noteworthy example was the U.S. promise, made at the 1976 UNESCO General Conference in Nairobi, to assist Third World countries in developing mass media capabilities. Two years later, when preparations for the 1978 UNESCO General Conference were in the final stages and WARC preparations were in the mature stage, the promise had produced no appropriated funds for the purpose, nor even a coherent plan for developing a program. This was not the first time that pledges of assistance in this area had produced no tangible results. Prior to the 1976 UNESCO General Conference in Nairobi, the Secretary of State had pledged assistance to developing countries in connection with satellite communications and sensing programs. Address by Secretary of State Henry Kissinger before the Fourth Ministerial Meeting of the U.N. Conference on Trade and Development at Nairobi (May 6, 1976), *reprinted in* 74 DEP'T STATE BULL. 657, 667 (1976). An essentially similar pledge was repeated by the President after the Nairobi conferences. Address by President Jimmy Carter before the Permanent Council of the Organization of American States, 13 WEEKLY COMP. OF PRES. DOC. 523, 525 (Apr. 18, 1977). As of late 1978, little had come of any of these pledges. ACADEMY FOR EDUCATIONAL DEVELOPMENT, *supra* note 9, at 5-6. Fortunately, a modest ($24 million over a six-year period) AID program to assist in the development of satellite service to rural areas was rescued from virtual oblivion in time to be announced at the 1978 UNESCO Conference. For a description of the project, see Agency for International Development, AID Rural Satellite Program (internal memorandum, Sept. 14, 1979). As of the end of 1979, however, no applications of the program had been approved.

[120] *See* note 119 *supra*. A 1978 internal AID survey of AID projects with communications components showed a total of some $28.3 million in assistance for fiscal year 1978; however, $16.6 million of this amount was for security-supporting assistance in the Near East and cannot qualify as development assistance. Agency for International Development, Survey of AID Projects with Communications Components (internal memorandum, Oct. 5, 1978). A description of the types of programs is given in ACADEMY FOR EDUCATIONAL DEVELOPMENT, *supra* note 9, at 138-53.

The modest results reflect an overall U.S. assistance policy in which communications and information technology and services rank near the bottom of aid priorities. Within the current policy framework of targeting aid programs on basic human needs—food/nutrition, population/health, and education/human resources development—it has been difficult to find a place for funding aid programs to develop communications or information systems. The basic human needs orientation reflects the essential character of the so-called "new directions" in aid policy mandated by Congress in 1973. *See, e.g.*, SENATE COMM. ON FOREIGN

One proposal addressing this general aid problem, as well as the lesser-included question of assistance in the field of communications, has special relevance to WARC. It has been suggested that if there ever is to be a redressing of the economic imbalances among nations, the developing countries must be able to commit themselves with their annual budgets beyond the vicissitudes of foreign assistance policies and the like.[121] One method of funding would be an excise tax on international activities such as transportation, commerce, and communications, with funds from the tax distributed into a special development fund for the benefit of the Third World.[122] Of interest in the present context is the suggestion that a tax be levied on the use of international resources, such as orbital positions for satellites and frequency allocations in the radio spectrum.[123]

There is a precedent of sorts for such a concept in the Draft Convention on the Law of the Sea, which contains an agreement in principle to a tax on deep seabed mining.[124] One can extrapolate

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Relations, International Development Assistance Act, S. Rep. No. 95-161, 95th Cong., 1st Sess. 6-14 (1977).

Even accepting the general philosophy of meeting basic human needs as a first priority of development assistance, it does not automatically follow that low priority should be given to communications and information systems. In fact, communications has an obviously important role to play in almost any scheme for meeting human needs. One need not suppose that possession of a radio or television set is itself a basic human need to recognize that these are important instruments of information with which to meet these needs. Consider, for example, food as a basic human need. I take it that aid which went for the purchase of plows would be deemed consistent with meeting this basic human need. Why not a television set? You cannot eat a television set, of course, but you cannot eat a plow either. A radio will not till the fields, but a plow will not provide information on weather, soil conditions, agricultural methods, etc. Information is the necessary, if not sufficient, condition for advancement. Recognition of that simple reality is providing the impetus for a new world information order as a special construct in the struggle for international fairness.

The problem of communications assistance is part of a larger question about the future direction and level of development assistance generally. Given the popular disenchantment with past economic assistance programs, U.S. foreign aid faces an uncertain future. Such general uncertainty will make it difficult to establish a strong role for development assistance in fields where it previously has not existed. Therefore, assistance for communications and information programs faces a not very promising future.

[121] *See generally* Independent Commission on International Development Issues, North-South: A Program for Survival (1980) (also known as the Brandt Commission Report).

[122] *See id.* at 244-45; H. Cleveland, The Third Try at World Order 67-68 (1977); E. Steinberg & J. Yager, New Means of Financing International Needs 26-38 (1978).

[123] *See* E. Steinberg & J. Yager, *supra* note 122, at 27-28.

[124] *See* Draft Convention on the Law of the Sea (Informal Text), art. 153 & Annex III, art. 13, U.N. Doc. A/CONF.62/WP.10/Rev.3 (1980) [hereinafter cited as Draft LOS Conven-

from this precedent a position that, in one form or another, use of the radio spectrum or geostationary orbit positions should be taxed on the principle of paying for and sharing the benefits derived from a commonly owned international resource.

There are a number of practical issues that must be addressed in evaluating the tax concept. Three basic questions immediately come to mind. First, how would the tax be assessed and the revenues be distributed among the countries?[125] Second, would the distributed revenues be earmarked for the special purpose of communications development, or could they be used for any purpose by the individual countries?[126] Third, how would the taxing mecha-

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tion] (providing for various fee and profit-sharing arrangements between individual mining entities and the International Seabed Authority).

For the U.S. position on this aspect of the Draft LOS Convention, see U.S. Dep't of State, Office of the Law of the Sea Negotiations, U.S. Delegation Report, Resumed Seventh Session of the Third United Nations Conference on the Law of the Sea, Aug. 21-Sept. 15, 1978, at 9-14 (undated).

The mechanism adopted for exploitation of the deep seabed could establish a model for other international arrangements relating to the development of common global resources, including the radio spectrum. *See Oceanography Miscellaneous—Pt. 2: Hearings on the Law of the Sea Conference Briefings Before the Subcomm. on Oceanography of the House Comm. on Merchant Marine and Fisheries*, 95th Cong., 1st & 2d Sess. 109, 124 (1977-1978) (remarks of Rep. Breaux); *id.* at 137 (statement of Richard G. Darman); Breaux, *The Diminishing Prospects for an Acceptable Law of the Sea Treaty*, 19 VA. J. INT'L L. 258, 261, 277 (1979); Darman, *The Law of the Sea: Rethinking U.S. Interests*, 56 FOREIGN AFF. 373, 387 (1978).

[125] Presumably the tax on domestic uses would be levied on governments, but the selection of a tax base still would have to be determined. Would all uses be taxed, or only those registered with the ITU? Would the tax be levied on the basis of number of assignments or bandwidth? Would all frequencies (whatever the unit) be taxed at the same rate? Would international users be taxed the same as domestic? secondary users the same as primary? passive the same as active? None of these problems would be impossible to resolve if there were agreement on the basic concept, but the difficulty of reaching international accord on some of these issues should not be underestimated.

Apart from how the tax is collected, the distributional issue is a difficult one. Insofar as the main purpose of the tax is international wealth redistribution, special shares presumably ought to go to developing countries. *Cf.* Draft LOS Convention, *supra* note 124, arts. 140, 144, 148, 150, 153, 160 (implying that "special needs" of developing countries demand special distributional shares of seabed mining benefits for them). Such a general principle leaves open a fair range of possible distributional arrangements.

[126] One rationale for an earmarked tax would be that the tax is payment for the benefits derived by users specifically for a well-developed system of communications. On this basis, an earmarked tax, at least in theory, serves economic efficiency better than a general revenue tax because it gives the user the ability to determine how much of that benefit should be "purchased" by adjusting the demand for the taxed good. *See* Buchanan, *The Economics of Earmarked Taxes*, 71 J. POL. ECON. 457 (1963). In addition to this theoretical consideration, earmarking may be an important form of control over the application of tax revenues in the absence of an international mechanism for overseeing expenditures. *See* E. STEINBERG

nism, including the tax rate, be established and controlled: on the basis of equal voting rights for each country (as for example, in U.N. specialized agencies and the U.N. General Assembly), or by weighted voting according to, say, use of the resource (as in INTELSAT)?[127]

From the U.S. perspective, the tax concept would involve a reorientation of U.S. foreign policy which generally has opposed mandatory international levies for economic assistance programs.[128] One can, of course, distinguish this particular tax from such levies on the ground that it is merely an equitable sharing of the benefits of an international resource. As a political matter, however, it almost certainly would be perceived simply as a form of foreign development assistance, and, as such, one that is at odds with traditional policy.

C. *Planning Spectrum Distribution*

As a scheme of wealth distribution, the tax proposal appeals in part to the notion that all nations should share equitably in the benefits derived from using a global common property resource. Implicit in this appeal is an assumption that the benefits of present use of the resource are not distributed equitably. Whether or not anything ever comes of the tax proposal, the underlying premise is almost certain to have a significant influence on the international spectrum allocation policies. This was apparent at the 1979 WARC. The theme of wealth redistribution not only per-

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& J. YAGER, *supra* note 122, at 182-92.

[127] In the Draft LOS Convention, *supra* note 124, the issue of institutional control was one of the major unresolved problems. The developing countries insisted on equality of voting rights for all members of the International Seabed Authority, whereas the developed countries insisted on some form of weighted voting power corresponding to their greater stake in seabed mining. *See Oceanography Miscellaneous*, *supra* note 124, at 146-49 (remarks of Richard G. Darman); Breaux, *supra* note 124, at 278-81; Smith, *The Seabed Negotiation and the Law of the Sea Conference—Ready for a Divorce?*, 18 VA. J. INT'L L. 43, 48 (1977).

The solution adopted by the Law of the Sea Conference embodies part of each approach. An Assembly is to consist of all members of the Authority, with each member having one vote. Each State which is a party to the LOS Treaty will be a member. The Assembly then will select a Council of thirty-six members charged with many of the duties of the Authority. Membership on the Council is determined by a complex quota system which requires seats to be set aside for developing countries, countries with the largest investments in the seabed mining field, and other countries with special interests. Each member of the Council will have one vote. Draft LOS Convention, *supra* note 124, arts. 159-162.

[128] *See* note 118 *supra*.

vaded the atmosphere of negotiations, but it also motivated many of the specific allocations decisions and the debate over planning.[129]

The planning issue—*i.e.*, whether and how to allocate frequencies in advance of need—is too complex to deal with here in detail. Some elaboration, however, is needed to understand this controversy, which has been and will continue to be among the most important and divisive problems faced by the ITU. The discussion will focus on the fixed-satellite service[130] because that service is likely to be the focal point of future space-services planning conferences.

Allotment plans make a one-time distribution on the basis of present needs and predicted future requirements, thus replacing the present ad hoc methods of assignment. One of the main difficulties with constructing such plans is that each country has an incentive to overstate its requirements, and there are few accepted or objective criteria for evaluating each country's stated need. In fact, the individual country itself may have only the dimmest perception of its needs over the time period for which the plan is to be constructed. This is a problem particularly with the new satellite services, with which most countries have had little domestic experience. Under these circumstances, it is easy to make a case that allotment plans are not only difficult to construct, but when constructed will lead to a waste of resources as frequencies and orbit positions are "warehoused" to meet future, indeterminate needs. The warehousing problems could be alleviated either by allowing frequency allotments to be transferred to another country or by imposing a condition of use within a specified period of time.

As to transferring allotments, it suffices here to say that under current plans, frequency allotments are not in a form which could be transferred except perhaps to closely adjacent countries. To create transferable rights would require a different planning scheme than any now in use or in contemplation.[131] The possibility of creating a different scheme, based on spectrum property rights transferable through an international spectrum market, is considered below.

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[129] It was most evident in the debate over allotment plans, particularly in the context of setting the agenda for the future space services planning conference. *See* text at notes 84-85 *supra*.

[130] *See* text at note 37 *supra*.

[131] Present allotment plans specify both transmission points and service areas for each frequency. A country may have, for example, an assigned orbital position from which it can transmit a signal of specified strength to a particular terrestrial location. A property right so defined would be of little use to another country seeking an orbital position and frequency to serve its own territory.

A condition of use within a specified period of time can avoid waste, but there remains the problem of how to redistribute unused frequencies. Fidelity to the planning approach requires that unused frequencies be redistributed according to a plan. Dealing with unused frequencies is part of the more general problem of modifying the plan to conform to changing circumstances. Herein lies the basis for the main criticism of allotment plans: They lack the flexibility required to adjust quickly and easily to changes in requirements and, equally important, to technological changes. The problem is especially acute where radio technology is changing rapidly, as is the case with satellite communications. An allotment plan constructed on the basis of present technology quickly can become obsolete with changes in both satellite and earth terminal requirements.[132]

The case against planning is easy to make, but also easy to overstate. International plans for some services, notably the maritime and aeronautical services, long have been an accepted feature of ITU practice, as has regional planning of domestic broadcasting.[133] Similarly, plans for the broadcast-satellite service at 12 GHz were established by the ITU in 1977,[134] a decision which the U.S. initially opposed but now has accepted.[135] Finally, virtually all countries accept planning of domestic allocations. The United States, for example, in allocating broadcasting frequencies, reserves TV and FM channels for specified markets regardless of immediate need.[136]

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[132] For example, a satellite allotment plan based on a specified minimum separation between satellites is subject to obsolescence with any change in satellite design that narrows the required separation. Such changes are occurring. Illustrative is the fact that, since the 1977 broadcast satellite plan, *see* note 72 *supra*, technological changes have permitted closer spacing between satellites while still retaining the same protection against interference.

[133] *See* notes 30-31 *supra* & accompanying text.

[134] *See* INTERNATIONAL TELECOMMUNICATION UNION, FINAL ACTS OF THE WORLD ADMINISTRATIVE RADIO CONFERENCE (1977).

[135] *See* Dizard, *sup*[illegible]te 11, at 165.

[136] Harvey Levin [illegible] contrasted U.S. domestic and foreign attitudes toward planning, and has suggested [illegible]pproach combining planning with market incentives. *See* H. Levin, Are U.S. Policies [illegible]ome and Abroad Consistent? The Case of Spectrum Reservations and Media Balance 5-[illegible] (unpublished paper prepared for the World Communications Conference, Annenberg School, University of Pennsylvania, May 1980) (copy on file with the author).

To these arguments, the U.S. rejoinder has been that it does not oppose all planning; its position both in international and domestic practice is that the case for planning must be carefully weighed in each instance based on distinctive efficiency and equity considerations.[137] If there is a flaw in the U.S. position, it lies not in inconsistency, but in excessive insistence on a purely analytical approach to the efficiency-equity issue. At WARC, the United States and other developed countries that shared its views on planning did not contest the argument that equity was an extremely important principle in resource allocation. They argued instead that equitable considerations did not compel support for planning. On the contrary, an unplanned assignment system would insure better that all future needs would be met because it would conserve over time more of the resource for distribution as needed.[138] The Third World fears of being preempted by earlier developed-country exploitation actually were belied by experience, because no one could show that there had been any such preemption, despite considerable satellite activity by both developing and developed countries.[139] The argument that preemption will not happen failed at WARC, and it probably will fail at the future planning conference because it cannot be proved that the perceived problem is not a real one: it cannot be proved that no country will ever be denied reasonable access to the spectrum or orbit. Such proofs are in the realm of religion, not engineering, and the protagonists do not share the same faith.

Despite the gap of trust that separates developing from developed countries in this regard,[140] I expect a settlement will be negotiated at the future space conference. Without attempting to predict the precise outcome of the future conference, I anticipate that some form of plan will be approved for selected frequencies and orbital slots used by the fixed-satellite service. The parameters of such a plan I will not attempt to imagine; these will be the subject of heated controversy. When the shouting is over, however, I doubt the Third World will insist on a plan that would be rejected by a significant number of the major space powers. The cost of making a political show of strength would be the loss of international coordination of satellite usage—a loss which must work to the relative disadvantage of the Third World *vis-à-vis* the major space powers. Moreover, I expect it will be possible to engineer a limited plan that will substantially, if incompletely, meet the objectives of developing countries and still remain acceptable to the developed countries. The United States undoubtedly will resist planning the entire fixed-satellite service, at least on the conventional pattern of the 1977 broadcast-satellite plan. But there may be acceptable alternatives—for example, in the form of guaranteed options to certain orbit positions, or allotments strictly limited to a few frequencies and positions.[141]

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[137] *See* Robinson, *The U.S. Faces WARC: The U.S. Position*, J. COM., Winter 1979, at 151, 155. For example, the United States has supported planning of certain HF frequencies, feeder links, and aeronautical services at the 1979 WARC and at other administrative conferences.

[138] *See* WARC DELEGATION REPORT, *supra* note 38, at 78-79 (statement of U.S. spokesman regarding resolution BP).

[139] There were reports of administrative difficulties in completing advanced coordination procedures for two domestic systems, Indonesia's Palapa and India's Insat. Some of these difficulties probably stem from the fact that, as a practical matter, the new entrant has the burden of showing compatibility with existing operations.

[140] At times during the 1979 WARC it seemed that the capitalist countries were uniquely the objects of Third World distrust. If so, it was probably because the Soviets challenged Third World proposals less often, for the simple reason that the proposals affected them only marginally.

I do not suggest that the United States should accept any plan merely in the spirit of accommodation regardless of the plan's merits or its impact on U.S. interests. But U.S. interests must have some flexibility. While the United States has a great deal at stake in terms of its use of these resources, it also is better equipped than most countries to adapt technologically to the regulatory constraints of planning. Also, the extensive space requirements of the

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[141] For example, under the guarantee option, developed countries occupying orbit positions might agree to time limits on their occupancy or might agree to be "bumped" from their positions if no slots were available within a specified period to accommodate developing country requirements. Academy for Educational Development, WARC 1979: Development Communications Strategies—A Report to USAID (H. Hudson ed. 1979). The first option in effect was crystallized in International Telecommunication Union, World Administrative Radio Conference for Space Telecommunications, Res. Spa 2-1 (1971), which provided that registration of assignments for space services should not give permanent priority to the country registering. Resolution Spa 2-1 was replaced at the 1979 WARC with a resolution which provides essentially the same, with some additional elaboration. WARC Final Acts, *supra* note 48, Res. AY. The United States and the ITU interpreted Resolution Spa 2-1 to mean that a registered frequency assignment for a satellite was valid only for the lifetime of the satellite initially launched, and the priority accorded that assignment did not extend to replacement satellites within the system even if the basic characteristics of the system were unchanged. Curiously, however, the 1979 WARC extended the effective lifetime of satellite assignments by limiting the life of the assignment to the satellite lifetime as indicated in the original assignment notice. WARC Final Acts, *supra* note 48, Res. BY. It also provides that this period can be extended to cover replacement satellites having the same basic characteristics as the original. *Id.*

United States give it a basis on which to claim a relatively large allotment of frequencies and space positions. By any distribution criteria that are likely to be acceptable to the major countries, the United States should do as well as any in having its needs met.

D. *Allocating By Market*

Insofar as any frequency or orbit position assignment fixes rights of priority use, it confers a form of property right, albeit a very limited one because the assignment cannot be transferred and is conditioned on usage in accordance with the table of allocations and related regulations. Allotment plans go a step further than the flexible assignment system in clearly defining and distributing spectrum rights and satellite orbit positions in advance of specific utilization. Nevertheless, the rights conferred in allotment plans are nontransferable and subject to conditions of use.

It has been argued that greater use-efficiency could be realized by allowing free transferability among users or even among different types of use or services.[142] Users then could purchase full property rights through a spectrum market. The concept of a radio spectrum market to allocate radio frequencies is not a new one; proposals to establish an open market or at least market-type mechanisms for *domestic* allocations have become fairly common over the past two decades.[143] In recent years there even have been signs of possible acceptance of market mechanisms as a vehicle for spectrum allocations in certain instances, though no specific steps have been taken yet to implement such mechanisms.[144]

Only recently has any serious attention been given to the possibility of an *international* spectrum market.[145] In terms of economic efficiency the theoretical case does not appear to be much different for an international spectrum market than for a domestic market. In both instances, a market mechanism presumably would facilitate distributions that maximized the economic value of each frequency. Indeed, one can argue that the economic efficiency argument is stronger for international than for domestic allocations. In the domestic setting, one can justify some degree of regulatory control as a means to insure that certain social needs are served which would not be adequately served by pure market allocations. The justification may be exaggerated in many instances in the domestic context, but in the international context there is very little basis for arguing the superiority of social over market choice. While the market deficiencies might be the same at the international level as at the domestic level, the regulatory mechanisms for addressing them are not. The ITU is not an international FCC. Only to a very limited degree, and in a very limited sense, does the ITU make allocations decisions based on any studied consideration or weighing of global social needs. In registering assignments to users within broad service classes, the ITU makes no social evaluation of the use at all.[146] Such evaluations are strictly the province of individual nations. One might argue therefore that, at least after a collective choice is made to allocate frequencies to certain services, a market system of distribution could not possibly impair any international social objectives because no such objectives have been defined.

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[142] *See, e.g.*, C. Jackson, A Market Alternative for the Orbit-Spectrum Resource (unpublished paper presented at the Sixth Annual Telecommunications Policy Research Conference, Airlie, Virginia, May 11, 1978) (copy on file with author).

[143] *See* Coase, *The Interdepartment Radio Advisory Commission*, 5 J.L. & ECON. 17 (1962); Coase, *The Federal Communications Commission*, 2 J.L. & ECON. 1 (1959). For a review of these proposals and later treatments, see H. LEVIN, *supra* note 51.

[144] *See* C. Ferris, Private Radio: A Feudal System or a Free Marketplace? (Mar. 20, 1980) (address by Federal Communications Commission chairman before the Annual Meeting of the Land Mobile Communications Council).

[145] On at least the conceptual level I believe the case for using market processes in *domestic* spectrum allocation is compelling. *See* Robinson, *The Federal Communications Commission: An Essay on Regulatory Watchdogs*, 64 VA. L. REV. 169, 240-43 (1978) [hereinafter cited as Robinson, *FCC*]. I should confess to having once harbored contrary views which I am now at a loss to justify. *See* Robinson, *Radio Spectrum Regulation: The Administrative Process and the Problems of Institutional Reform*, 53 MINN. L. REV. 1179, 1248-65

Establishing an international market mechanism would not be a

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(1969). In some instances I doubt that a pure market system would prove feasible or even desirable, but in virtually all instances the use of market mechanisms in aid of bureaucratic decisionmaking seems to be both practicable and desirable. The use of market-type mechanisms would include, for example, the use of "shadow pricing" or market simulation methods which would calculate the value of the spectrum in different uses. For a discussion of such techniques, see H. LEVIN, *supra* note 51, at 117-57.

Apart from using market simulation techniques as an aid to spectrum allocation decisions, the imposition of a variable tax based on the estimated value of the spectrum in different uses could be used to achieve much the same objectives. Such a tax ("fee") was proposed in 1979 as part of a general revision of the Communication Act. H.R. 3333, 96th Cong., 1st Sess. § 414 (1979). Along with many other reforms, the tax/fee proposal did not survive the sharp attacks of industry.

[146] The only such evaluation by the ITU is in allocating frequencies to broadly defined services such as broadcasting, radiolocation, and fixed-satellite. Even here the "evaluation" consists principally in making technical assessments of the different national proposals, and attempting to reach a political consensus that does not necessarily rest on any valuation of competing radio uses by the ITU membership.

simple matter. There are practical and technical problems of defining rights so as to ensure easy transferability among different uses having different operating parameters.[147] A system in which frequencies were transferable only within a particular, narrowly defined service or type of use would be much easier to administer than one in which frequencies were transferable across a wide range of services. It should not be inordinately difficult to devise a market system for particular orbit segments for one specific service such as broadcast-satellite service, within a particular region. Presumably such a market is what the equatorial countries contemplate with their claims of sovereignty to that portion of the geostationary orbit that lies above their respective countries.[148] But, of course, their contemplation is that they alone would own the resource.[149] The market therefore would be dominated by a "geostationary OPEC."

In discussing the efficiency of market process in allocating resources so far I have ignored considerations of "equity" or wealth distribution. Much of the objection to implementing a domestic spectrum market appears to rest, explicitly or implicitly, on the notion that it would be unfair to distribute frequencies according to the ability to pay.[150] In a capitalist society where most resources, public as well as private, are distributed through the market, it seems strange to single out the radio spectrum for such an objection. The objection, moreover, is misplaced. Relative wealth is not the only determinant of resource distribution; relative utility and intensity of demand are equally important. Consider, for example, two communications firms seeking an orbit position. Whether firm *A* has greater wealth (or expendable income) than firm *B* is less important than the relative utility and demand functions of the two. Indeed, in the case of competing commercial users their relative "wealth" is largely meaningless as long as they have reasonable access to capital markets. Interests of noncommercial users may require special accommodation, but that is less a concern of equity than of efficiency—whether the social utility of the noncommercial use requires a special regulatory allocation.

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[147] *See* H. LEVIN, *supra* note 51, at 85-115. For an analysis of how the problems associated with free transferability of frequencies and orbit positions could be handled, see C. Jackson, Technology for Spectrum Markets (1976) (unpublished Ph.D dissertation on file in Michigan Institute of Technology Library).

[148] *See* note 46 *supra*. Colombian representatives at WARC denied that this was the motive for the claim and instead insisted that the claim was made to preserve its future right of access to the orbit. The two motives are not inconsistent. The sovereignty claim is plenary and includes not only a right of future access by the equatorial countries, but also the right to specify the terms on which other countries could use unoccupied space.

[149] This applies only to segments of the orbit directly above the territory of the respective equatorial countries. Orbit segments above the open sea beyond national jurisdictions, under the Bogotá Declaration, *supra* note 46, would be the "common heritage of mankind" and now subject to national sovereignty claims. Gorove, *supra* note 46, at 451.

[150] *See, e.g,* Anthony, *Towards Simplicity and Rationality in Comparative Broadcast Licensing Proceedings*, 21 STAN. L. REV. 1, 101-02 (1971) (raising the objection in the specific case of broadcast licenses). For rebuttal argument, see Robinson, *FCC, supra* note 145, at 242-43.

In theory these "equity" considerations ought to apply to international as well as domestic allocations. If it would be fair for, say, Satellite Business Systems to buy required frequencies or orbit positions from Western Union, would it be any less fair for that same firm to buy them from Telesat Canada—or, of course, vice versa?

Whether a market approach to spectrum allocation would be "fair" depends considerably on how the resource is distributed initially. A distribution which would give satellite orbit positions to a handful of subadjacent equatorial countries, must be rejected as unfair because such countries could not advance any credible basis on which they should be so favored.[151]

One approach would be to make an initial distribution by auction. After the rights had been appropriately defined according to technical or other parameters (such as limitations as to class or service), an auction might be conducted under ITU auspices, with each country competitively bidding for such rights. Such an approach, whatever its theoretical merit on efficiency grounds, is unlikely to be accepted on grounds of equity: Third World countries would see this as merely another manifestation of their economic "subordination" to a handful of rich countries. On the other hand, their perception might be altered significantly if, instead of an auction, an initial distribution of property rights were made on some "equitable" basis that did not require payment. This would sacrifice the efficiency of an auction, but it would preserve the more important efficiency of allowing subsequent sale or exchange of rights. The trick here is to formulate an initial distribution that would be acceptable as "equitable."

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[151] For a list of arguments and counterarguments, see Gorove, *supra* note 46, at 451-53. Most of the arguments deal with whether the geostationary orbit can be regarded as outer space within the meaning of the Outer Space Treaty of 1967, which precludes sovereignty claims to outer space. Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, Including the Moon and Other Celestial Bodies, art. II, *opened for signature* Jan. 27, 1967, 18 U.S.T. 2410, T.I.A.S. No. 6347, 610 U.N.T.S. 205. A central argument of the Bogotá Declaration signatories is that the orbit depends on the gravitational pull of the earth and so is not outer space. But the same argument could be applied to the moon, to which even the Bogotá signatories do not lay claim. Moreover, in any event the gravitational influence is a function of the entire mass of the earth, to which the equatorial countries contribute negligibly. Thus, if gravitational influence is the touchstone, countries such as the United States, Canada, People's Republic of China, and the Soviet Union would have more substantial claims than the equatorial countries.

Even if one were to consider that the orbit is not outer space and thus not governed by the Outer Space Treaty, it still would not follow that subadjacent countries have preemptive claim to it. At bottom, the sovereignty claim rests on nothing more sophisticated than an extreme application of the ancient maxim of English common law, *cuius est solum eius est esque ad coelum*. Some application of this principle is implicit in the concept of territorial sovereignty, but there is no basis in international law or custom for applying it without limit. Finally, in terms of simple "fairness," the case for a monopolistic claim by a bare handful of equatorial countries is hard to square with conventional formulations of equity.

An equal distribution, based on the notion of sovereign equality among all countries, might commend itself on the grounds of simplicity but on no other ground. The fact that Upper Volta and the United States have an equal vote in the U.N. General Assembly does not dictate that each have an equal share of the radio spectrum. It is difficult to formulate any principle of "natural justice" that would warrant such egalitarianism among countries with widely disparate populations and other economic and social conditions. At the same time it is difficult to formulate any other obviously fair bases for distribution. As a practical matter, the best solution might be simply to determine a distribution based on ad hoc, negotiated bargains with respect to discrete areas of the spectrum. Essentially this is the process now used to develop allotment plans except that such plans do not recognize or permit transfers of allotments among users. Such plans may not conform to any theoretical mode of equity, but they provide a basis on which a fair bargain could be struck. The principal problem with such plans is not inequity, but inefficiency.[152] Were such plans reconstructed to permit at least limited transfer of allotments among different countries they would be enormously more responsive to efficiency interests while remaining reasonably faithful to the equity considerations.

One need not imagine a total overhaul of the present system to speculate on the possibility of introducing market processes in some parts of it—for example, in those cases where an allotment plan exists or is proposed. To simplify the technical aspects, the market could be limited to transfers to a specific class of service with defined operating parameters.

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[152] *See* text at notes 131-32 *supra*.

Despite the foregoing, I do not look for any significant movement toward introducing market processes in the immediate future. And in the context of present domestic policies there is little basis on which to recommend U.S. initiative in this direction at this time. I cannot imagine any major country, the United States included, proposing such a scheme for international consumption before at least experimenting with domestic application. So far as I am aware, no country outside the United States seriously has contemplated introducing market processes in the area of spectrum management. Even within the United States, where serious proposals have been advanced, *official* interest largely has been confined to acknowledging that such proposals exist.[153] More than that will be required before anything can come of proposals for an international market. The possibility of limited experimentation ought to be studied, for if the trend towards fixed allotment plans persists, a market scheme allowing transfer of allotments would provide the flexibility needed to make efficient use of such allotments.

E. *Future Conferences*

Some of the major issues at the 1979 WARC were postponed to a series of specialized regional WARCs to be held throughout the 1980's.[154] Such specialized conferences are not new, but the scheduling of a series of such conferences by a general WARC is unique, setting out a new pattern of ITU activity. Thus, during the next twenty years a continuing series of smaller conferences will deal with specific parts of the spectrum where technological and other changes mandate revision of the radio regulations. It may be that another general WARC authorized to make decisions on the entire spectrum will not be convened for the indefinite future.[155]

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[153] *But see* C. Ferris, *supra* note 144 (advocating use of the marketplace as a means of allocating use of the domestic spectrum).

[154] For a list of conferences recommended at WARC 1979 or previously scheduled on the ITU agenda, see WARC Final Acts, *supra* note 48, Rec. XM. This list includes: a plenipotentiary conference; world administrative radio conferences for space services, HF broadcasting, and mobile services; six regional conferences (principally planning conferences dealing with individual services); and two subregional planning conferences.

[155] *But see* WARC Final Acts, *supra* note 48, Rec. XP (recommending that the Administrative Council "consider as from 1990" whether it may be necessary to convene another

As a practical matter there is probably no compelling reason to have another conference of a scope comparable to the 1979 WARC. Successful as this Conference was, one could not pretend that such big events are the best way to negotiate and implement changes in a well-defined, functioning regulatory ~~system~~. There certainly appeared to be no efficiencies of scale in bringing together separate problems of radio frequency allocations at the 1979 WARC. For example, the problems of finding new allocations for the fixed-satellite service obviously was not helped by contemporaneous consideration of the problem of HF frequency allocations. One might suppose, of course, that joinder of such different tasks might make sense if negotiating tradeoffs among participants were possible with regard to, say, HF broadcasting and fixed-satellite uses. The nature of the forum and the traditions of the ITU, however, have not promoted a negotiating flexibility that is conducive to making "deals" involving widely disparate frequency allocation problems. Perhaps it is easier to make common cause with parties on a particular issue, such as HF broadcasting, if one also has a common interest in others, for example, fixed-satellite service. But if that is true, so also is the converse: Conflicts on one issue may spill over to another, aggravating the problems of settlement. The wider the range of different problems, the greater the number of conflicts, and the more likely the possibility that a hostile environment will preclude consensus. The fact that the 1979 WARC was able to surmount these problems should not lead to an endorsement of larger over smaller conferences. The success of the 1979 WARC is merely a testament to the underlying strength of an organization which achieves international agreement by focusing on highly specialized problems, and not on general political issues. The ITU should continue its practice of "thinking small," and it is most likely to do that by emphasizing routine continuous negotiation and small specialized conferences, as opposed to "big events" such as the 1979 WARC.

V. CONCLUSION

Despite some of the pre-WARC warnings that the ITU was be-

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general WARC). Recommendation XP was adopted in the late hours of the Conference when virtually no one considered it worthwhile to debate the issue. Since the recommendation is cast in such tentative terms, it must be regarded as essentially meaningless.

coming a forum for political confrontation,[156] the ITU survived the 1979 Conference quite well as a forum for rational negotiation. Certainly, there is no reason for the United States to reconsider its commitment to the ITU as some suggested, before WARC, that we might have to do.[157] On the contrary, the United States has every reason to continue to regard the ITU as an effective organization for reaching essential international agreement on the radio spectrum usage. Not all of the debate and discussion at the Conference was sensible, but particularly measured against current standards of national and international political discourse, the dialogue at WARC proved on the whole to be quite dispassionately rational and constructive.

Whether dominated by big events or characterized by more or less continuous processes of negotiation, the problems of international communications policy have a future that is rich in complexity and large in importance. The ITU can play a significant role in addressing those problems. If it maintains the same attention to tangible objectives and disdain for rhetorical posturing as it did in the 1979 WARC, the ITU indeed can be a model for international negotiation generally.

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[156] *See* note 14 *supra* & accompanying text.

[157] *See* 125 CONG. REC. S9311, S9313 (daily ed. July 12, 1979) (Report on U.S. Preparations for the World Administrative Radio Conference of 1979, prepared by the Congressional Research Service for the Senate Committee on Commerce, Science, and Transportation) (noting the suggestion by others of withdrawal from ITU, but rejecting it as a practical option).

UNCLASSIFIED

DEPARTMENT OF STATE

TD Serial No. 116

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OFFICE OF INTERNATIONAL
COMMUNICATIONS POLICY

REPORT OF THE CHAIRMAN OF THE
UNITED STATES DELEGATION
TO THE
WORLD ADMINISTRATIVE RADIO CONFERENCE
OF THE
INTERNATIONAL TELECOMMUNICATION UNION

Geneva, Switzerland

September 24 - December 6, 1979

Submitted to the Secretary of State by

Glen O. Robinson

Chairman, United States Delegation

Prepared by Members of the Delegation

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The Honorable
The Secretary of State
Washington, D.C.

Sir:

As Chairman of the United States Delegation to the World Administrative Radio Conference of the International Telecommunication Union, which was held at Geneva, Switzerland from September 24 through December 6, 1979, I have the honor to submit a report of the activities of the Conference, the results of its work, and the United States participation therein.

I. BACKGROUND

A. The World Administrative Radio Conference was held at the Centre International de Conferences de Geneve, from September 24, 1979 to December 6, 1979, under the auspices of the International Telecommunication Union (ITU). Founded in 1865 as the International Telegraph Union, the ITU is the oldest existing organization associated with the United Nations, of which it is the specialized agency for telecommunications.

B. The last General World Administrative Radio Conference was held in 1959, in Geneva, Switzerland. It essentially adopted the format of the Table of Frequency Allocations and procedural regulations established at the prior General World Administrative Radio Conference held in Atlantic City in 1947.

C. The increased complexity of radiocommunication techniques, coupled with heightened competition for space in the electromagnetic spectrum, gave rise to a new forum in the early 1960's -- the specialized world administrative radio conference. Specialized conferences consider and revise, in the light of experience and technological advance, the Radio Regulations pertaining to a limited aspect of radiocommunications. (The Radio Regulations, though formally annexed to the International Telecommunication Convention, the basic instrument of the ITU, have separate treaty status.) There have been eight specialized World Administrative Radio Conferences since the early 1960's:

1963: Space Conference (Spa)
1964, 1966: Aeronautical Conference (Aer)
1967: Maritime Conference (Mar)
1971: Space Conference (Spa2)
1974: Maritime Conference (Mar2)
1977: Broadcasting-Satellite Conference (Sat)
1978: Aeronautical Conference (Aer2)

D. The Plenipotentiary Conference, held in Malaga-Torremolinos in 1973, took the first steps (Resolution No. 28) to convene the 1979 World

Administrative Radio Conference (WARC). It based its decision on the following:

1. that, since 1959, various world administrative radio conferences have amended the Radio Regulations and Additional Radio Regulations on specific points without having been able to harmonize the decisions taken because of the limited nature of their agenda;

2. that, as a result of technical advances, some of the provisions in these Regulations should be reconsidered, particularly with regard to certain services which are developing rapidly;

3. that, for these reasons, a general revision of the Radio Regulations and of the Additional Radio Regulations should be undertaken.

E. Action by the Administrative Council:

1. At the 30th Session (1975) of the Administrative Council, the Council considered Resolution No. 28 cited above and held an exchange of views on the agenda of the Conference and on the necessary preparations for holding it. The Council decided that the agenda, date and duration of the Conference should be fixed by the Council at its 31st Session through a consultation of Member administrations The Council also instructed the Secretary General to invite administrations to send to him for submission to the Council any suggestions they might wish to make on the items mentioned. The Secretary General also had to ask administrations for their opinions on the studies to be undertaken by the permanent organs of the Union, including the need for convening a special joint meeting of the International Radio Consultative Committee (CCIR) Study Groups in 1978 (subsequently called the Special Preparatory Meeting).

2. At its 31st Session (1976), the Council examined Members' replies to the consultation held by the Secretary General and drew up a draft agenda for the Conference; this draft was approved by the Members, but the Council, after discussing the matter, left open the possibility of re-examining the question at its next Session if necessary. The Council further decided that the CCIR Special Preparatory Meeting should be held during the last quarter of 1978, to ensure that the technical data required for the preparations for the Conference were brought up to date.

3. At its 32nd Session (1977), the Council had to reconsider the agenda of the Conference, particularly as the result of certain decisions taken by the WARC for Satellite Broadcasting (Geneva, 1977) In accordance with No. 221 of the Convention, the Council proposed to the Members of the Union a final agenda which was accepted by the majority of the Members (Resolution No. 801). At that same Session, the Council adopted Resolution No. 804, whereby the CCIR was invited to carry out the studies necessary to ensure timely provision of the

technical information likely to be needed as a basis for the work of the Conference, and to arrange for a Special Preparatory Meeting of the CCIR Study Groups for the purpose of providing documentation to serve as a technical basis for the Conference. The CCIR was also invited to make the necessary arrangements to ensure the widest possible participation in this Special Preparatory Meeting.

4. At its 33rd Session (1978), the Council drew up the budget of the Conference and adopted a series of Recommendations, some relating to the period of preparations for the Conference and others to the work of the Conference itself. The purpose of these Recommendations was to reduce the volume of work of the Secretariat or to distribute the work in a timely fashion.

F. The CCIR held the Special Preparatory Meeting (SPM) in Geneva during the period October 23 - November 17, 1978. Under the chairmanship of Dr. John A. Saxton (U.K.), the SPM was attended by more than 700 delegates and observers from 85 administrations, 40 recognized private operating agencies and scientific and industrial organizations, 3 U.N. specialized agencies, and 15 regional and international organizations. The purpose of the meeting was as follows:

> "To prepare a Report providing technical bases for the WARC-79 and for the use of Administrations in preparing their proposals to that Conference. This Report is to be based on the texts approved by the XIVth Planary Assembly of the CCIR as well as on new contributions submitted by Administrations and other participants in the work of the CCIR; the Report should be presented in a form consistent with the various items of the Agenda of the WARC-79."

The results of the SPM were published by the ITU in a 525 page document that was distributed to all administrations as WARC Document No. 13. The SPM Report was based on current reports and recommendations of the CCIR Study Groups and on the contents of more than 300 new documents submitted directly to the meeting. The report provided an extremely valuable technical basis for the 1979 WARC deliberations, particularly since it was arranged in a logical narrative format rather than the somewhat confusing multitude of independent reports and recommendations presently found in the CCIR Green Books.

G. The Secretary General, in close cooperation with the Director of the CCIR and the International Frequency Registration Board (IFRB), held three Regional Seminars in preparation for the 1979 WARC, primarily for the benefit of developing countries. The location and dates were as follows:

Nairobi, Kenya	February 12 - 23, 1979
Panama City, Panama	March 12 - 23, 1979
Sydney, Australia	March 29 - April 10, 1979

The seminars were well attended by countries of the respective Regions, in large part due to the fact that funds were provided to pay for travel and expenses of two participants from each developing country in the area. Lecturers were drawn from the ITU staff, from developed countries, and from developing countries. The U.S. provided a speaker on the subject of allocations above 40 GHz at each of the three seminars. In addition, there were approximately ten observers from the U.S. at each seminar, for the purpose of establishing or renewing contact with foreign participants, providing technical and operational expertise on the various issues, and advancing the U.S. proposals and objectives as appropriate.

II. AGENDA

The Agenda of the 1979 World Administrative Radio Conference, as adopted by the Administrative Council (Resolution 801) and subsequently approved by the Conference was as follows:

> "That the Conference shall be convened in Geneva on 24 September 1979 for a duration of ten weeks,
>
> 1. To review and, where necessary, revise the provisions of the Radio Regulations relating to terminology, the allocation of frequency bands and the directly-associated regulations (Articles 1 to 6 and Sections I, II, III, VI, VII, VIII and IX of Article 7 and related Appendices not applying to a single service);
>
> 2. to review and, where necessary, revise the provisions applicable to the coordination, notification and recording of frequency assignments except those Articles relating to a single Service (Articles 9 and 9A, and related Appendices, but not Articles 9B and 10);
>
> 3. to review and, where necessary, revise the other Articles applicable to more than one Service (Articles 12 to 20 and related Appendices not applying to a single Service) and provisions applicable to miscellaneous stations and Services (Articles 41 to 44 and related Appendices);
>
> 4. to make any necessary consequential editorial amendments to other provisions of the Radio Regulations and the Additional Radio Regulations resulting from the action taken under agenda items 1, 2 and 3 above;
>
> 5. to review the report on the activity of the IFRB and revise, where necessary, the provisions relating to its methods of work and internal regulations (Articles 8 and 11);
>
> 6. to study the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions;

7. to take account of Resolution No. Sat-10 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977, on the possible rearrangement of the Radio Regulations and Additional Radio Regulations, to make such consequential changes as may be necessary to harmonize the Radio Regulations as well as the Additional Radio Regulations and to undertake any further necessary refinement and deletion of superfluous or redundant provisions;

8. to consider the proposals based on the International Telegraph and Telephone Consultative Committee (CCITT) studies carried out in accordance with Resolutions Nos. Mar2-22 and 23, and to take appropriate decisions;

9. to consider the Resolutions and the Recommendations adopted by Administrative Radio Conferences, to take such an action as may be considered necessary and to adopt such new Resolutions and Recommendations as may be necessary;

10. to propose to the Administrative Council and to the next Plenipotentiary Conference a programme for convening future Administrative Radio Conferences to deal with specific Services;

11. to provide, for the benefit of future Administrative Radio Conferences, such guidelines as may be found necessary for optimum use of the frequency spectrum."

III. PREPARATION FOR THE CONFERENCE

A. The U.S. preparation for the 1979 WARC was by far the most extensive ever undertaken for an ITU or any other telecommunications event. In fact, WARC was one of the largest international conferences in which the United States has ever participated. It was the first general conference in twenty years with the power to consider all uses of the radio frequency spectrum as well as related technical and procedural provisions. Results of the 1979 WARC are expected to guide the development and use of communication-electronic equipment and the operation of national and international radio systems into the next century. Therefore it was natural that there was deep and widespread interest in all sectors of the telecommunications community within and outside the U.S.

B. Domestic activities:

1. The National Telecommunications and Information Administration (NTIA) (and its predecessor, the Office of Telecommunications Policy), as manager of the Federal Government sector in this field, formally began its preparation in January 1974 when its Interdepartment Radio Advisory Committee (IRAC) established Ad Hoc 144. All federal agencies with major radio interests are members of IRAC and participated actively in the work of the ad hoc group. Its terms of reference were: "To develop recommended U.S. proposals for the 1979 WARC, comments on the proposals of other administrations and position papers for the U.S.

delegation to the Conference, and to plan for the eventual national implementation of the Final Acts of the Conference." The result of this effort was NTIA's submission of recommended U.S. proposals to the Department of State in December 1978.

2. The Federal Communications Commission (FCC), as regulator of private sector telecommunications, initiated formal public proceedings on WARC preparations in January 1975 with the release of the First Notice of Inquiry in Docket 20271. An internal steering committee consisting of members from each of the FCC's bureaus and offices was established to provide overall coordination of the Commission's efforts. A formal Industry Advisory Committee and twenty-two service working groups dealing with specific issues were set up to provide direct input to the FCC staff. The Commission issued a total of nine Notices of Inquiry on various aspects of the WARC agenda, the most significant being the 3rd, 5th and 8th which treated the Table of Frequency Allocations. In December 1978, the FCC completed its Inquiry and released a Report and Order containing recommended U.S. proposals, which were submitted to the Department of State.

3. The Department of State, itself a member of IRAC, worked closely with NTIA and FCC on the development of national proposals from the beginning in 1974. In addition, the Department began in 1975 to consider other aspects of the preparatory effort, such as funding for U.S. delegation participation, selection of the Head of Delegation and other members, and a program of foreign consultations. This effort was formalized in September 1976 with the creation of a high-level Policy Group comprised of the OTP Director, the FCC Chairman, the Department's Deputy Assistant Secretary responsible for telecommunications, and senior officials of other key agencies "as required".

In early 1977 the Department initiated a worldwide effort through its overseas posts to obtain foreign views and other details regarding preparation for the 1979 WARC. Replies from Embassies provided an invaluable source of information on foreign positions. In January 1978 the Department named the Chairman of the U.S. Delegation to the WARC, who was responsible directly to the Deputy Secretary of State. He was assisted by a specially established staff which eventually included six high- and mid-level officers.

An initial delegation group of twenty persons was formed in April 1978 with membership drawn from federal government agencies active in WARC preparations. One month later, the Department established a 38-member public advisory committee comprised of a balanced membership drawn from industry and the general public. The general purpose of both groups was to advise the Department and specifically the Chairman of the U.S. Delegation on all WARC matters, and to develop positions and negotiating strategies for the Conference.

The Department received recommended proposals from the FCC and NTIA in December 1978, which were melded into a unified set of U.S. proposals for transmittal to the ITU. All but one part of the U.S. proposals were sent to Geneva in January 1979. Proposals relating to Frequency Allocations below 27.5 MHZ were forwarded to the ITU in April, after resolution of different views regarding requirements for international shortwave broadcasting. In May 1979 the Department accredited a delegation of 64 persons (later increased to 67) and 6 Congressional advisers.* A Geneva support group of 34 persons (later increased to 40) was also named at the same time.

The difficult process of selecting delegates and determining the size of the delegation and support team was based on several criteria. First was the need for expertise and experience in spectrum management generally, and in the specific areas addressed by the WARC agenda and the U.S. proposals. This expertise was not confined to professional engineers, though they comprised the largest group in this category. A second need was experience in general political and foreign affairs independent of specific background in ITU activities. Third was the need for representation of various domestic interests, including federal agencies, industries and general public groups, that would be significantly affected by WARC. Fourth, there was a mandate to seek out women and minorities. Finally, there was the Departmental policy to keep the accredited delegation to the minimum number necessary to accomplish the mission. The final U.S. team of 67 delegates (plus 2 Congressional advisers) and 40 support personnel represented a considered balance of the factors listed above.

C. Foreign consultations: Beginning in 1977 the U.S. engaged in extensive international consultations on WARC with a view to explaining U.S. views on the Conference and obtaining information on foreign positions. Substantial effort was given to and emphasis placed on visits by small teams of U.S. experts to foreign capitals to carry out face-to-face, one-on-one discussions with appropriate telecommunications officials and organizations. While not able to visit all countries desired, it was possible to visit 48 countries for bilateral talks, with a good balance between developed and developing nations. The countries visited were as follow:

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*Senators Goldwater and Hollings and Representatives Hollenbeck and McDade were accredited but did not attend the Conference. Therefore, their names do not appear in the WARC List of Participants or in Annex B of this document.

Algeria
Fed. Rep. of Germany
Saudi Arabia
Argentina
Australia
Brazil
Cameroon
Canada
Chile
People's Rep. of China
Colombia
Republic of Korea
Ivory Coast
Denmark
Egypt
Spain
France
Ghana
Greece
India
Indonesia
Iran
Israel
Italy
Japan
Kenya
Liberia
Morocco
Mexico
Nigeria
Norway
New Zealand
Pakistan
Panama
Netherlands
Peru
Philippines
United Kingdom
Senegal
Singapore
Sudan
Switzerland
Turkey
U.S.S.R.
Uruguay
Venezuela
Yugoslavia
Zaire

In addition to biateral discussions described above, the U.S. participated in multilateral forums such as NATO's Allied Radio Frequency Agency, CEPT (Conference of European Postal and Telecommunications Administrations) and CITEL (Inter-American Telecommunications Conference), an arm of the OAS. The U.S. also attended the three ITU Regional Preparatory Seminars for WARC, held in Nairobi, Panama and Sydney. In each multilateral event, U.S. attendees endeavored to establish bilateral contacts with as many foreign participants as possible, and in particular, with persons from countries not visited.

D. The massive preparatory effort undertaken by the U.S. resulted in specific objectives for the 1979 WARC that were contained in more than 900 individual items submitted to the Conference as the formal U.S. Proposals. In addition, the U.S. developed four general objectives for the Conference to provide broad guidance to the delegation. They were as follows:

1. To achieve international agreement on necessary changes in the ITU regulations on the orderly use of the electromagnetic spectrum in order to enhance U.S. economic, social and national security interests.

2. To maintain those ITU procedures which provide maximum flexibility and adaptability to changing needs.

3. To support incremental changes in international allocations and related frequency management procedures which will accommodate the needs of other nations, consistent with our own essential requirements, while endeavoring to avoid or limit the impact of politically inspired efforts to restrict our use of the spectrum.

4. To assure an outcome of the Conference which will support the role of the ITU as the international organization responsible for implementing WARC decisions, while not adversely affecting the sovereign rights of the United States.

IV. PARTICIPATION

At the time of the Conference, the Union consisted of 154 member countries. One hundred forty-two (142) Members participated in the Conference and were represented by approximately 1670 delegates and advisers. Fifteen of the participating countries were not entitled to vote at the Conference and nine were not entitled to sign the Final Acts. (See also Section VII B, Report of the Credentials Committee.)

Present as observers were approximately 130 participants from one private operating agency, the United Nations and five of its Specialized Agencies, three regional organizations and twenty-six other international organizations. In addition, approximately 150 ITU officers and staff members and a large number of interpreters and translators participated in and/or supported the Conference on a full-time basis. A list of the countries with number of delegates and ITU country symbol, and a list of the organizations in attendance is attached as Annex A.

The United States participated in the 1979 WARC with an accredited delegation of 69 members, including two Congressional advisers. This was the second largest delegation at the Conference, after the French (87 delegates). For comparison purposes, the next largest delegation was that of the Federal Republic of Germany with 51 delegates. Nine countries participated with delegations of 30 or more members.

The U.S. Delegation was supported in Geneva by a group of 40 persons consisting of technical, computer and administrative personnel. The delegation was also supported by a home team in Washington headed by Mr. Gordon L. Huffcutt of the State Department and comprised of representatives from each of the interested government agencies. A list of the persons comprising the U.S. Delegation and the Geneva support team is attached as Annex B. Because of its unique direct relationship to the Department in preparation for WARC, the membership of the Department of State Public Advisory Committee is also listed in Annex B. It is unfortunate that it is impossible to list the names of hundreds of other individuals who played an active and significant role in the U.S. preparation for and participation in this important conference.

V. ORGANIZATION OF THE CONFERENCE - COMMITTEE STRUCTURE

A. Conference:

Chairman of the Conference: Mr. R. J. P. SEVERINI (Argentina)

Vice-Chairmen of the Conference:
Mr. A. L. BADALOV (USSR)
Mr. J. JIPGUEP (Cameroon)
Mr. H. KIEFFER (Switzerland)
Mr. LI LINCHUAN (China)
Mr. A. PETTI (Italy)
Mr. Glen O. ROBINSON (USA)

(Note: Kieffer had the special role as overall coordinator of Committees 4, 5, and 6.)

Secretary: Mr. M. MILI

Executive Secretary: Mr. A. WINTER-JENSEN

Technical Secretary: Mr. G. BROOKS, assisted by Mr. A. A. MATTHEY

Administrative Secretary: Mr. U. PETIGNAT

Legal Adviser: Mr. A. NOLL

B. Committees:

Committee 1 - Steering Committee

Chairman: Mr. R. J. P. SEVERINI
Members: Consists of Chairman and Vice-Chairmen of the Conference, and of the Chairmen and Vice-Chairmen of the other Committees
Secretary: Mr. H. POULIQUEN
U.S. Spokesman: Mr. Glen O. ROBINSON
Terms of Reference: To coordinate the work of the Committees, fix the timetable of meetings, etc.

Committee 2 - Credentials Committee

Chairman: Mr. C. J. MARTINEZ (Venezuela)
Vice-Chairman: Dr. Amer JOMARD (Iraq)
Secretary: Mr. A. WINTER-JENSEN
U.S. Spokesman: Mr. K. SCHAEFER
Terms of Reference: To verify the credentials of delegations and to report on its conclusions to the Plenary Meeting within the time specified by the latter.

Committee 3 - Budget Control Committee

Chairman: Mr. Z. KUPCZYK (Poland)
Vice-Chairman: Mr. K. P. R. MENON (Malaysia)
Secretary: Mr. R. PRELAZ
U.S. Spokesman: Mr. C. WARVARIV
Terms of Reference: To determine the organization and the facilities available to the delegates and to examine and approve the accounts for expenditure incurred throughout the duration of the Conference.

Committee 4 - Technical Regulations Committee

Chairman: Mr. N. MORISHIMA (Japan)
Vice-Chairman: Mr. M. CISSE (Senegal)
Secretary: Mr. C. GLINZ
U.S. Spokesman: Mr. R. PARLOW
Terms of Reference: To consider proposals concerning the following Articles:

Article N1, Terms and Definitions, Section V, Space, Orbits and Types of Objects in Space, Section VI, Technical Characteristics;

Article N2, Nomenclature of the Frequency and Wavelength Bands used in Radiocommunication;

Article N3, Designation of Emissions;

Article N4, Technical Characteristics;

Article N16, Interference;

Article N17, Tests;

and the related Appendices 3, 4, 5, and B.

To consider proposals concerning technical provisions included in the following Articles:

Article N25, Terrestrial Radiocommunication Services sharing Frequency Bands with Space Radiocommunication Services above 1 GHz;

Article N26, Space Radiocommunication Services sharing Frequency Bands with Terrestrial Radiocommunication Services above 1 GHz;

Article N27, Special Rules relating to Space Radiocommunication Services;

Article N33, Radiodetermination Service and Radiodetermination Satellite Service, Section IVB, Radiobeacon Stations;

and the related Appendices 28 and 29.

To consider as appropriate to the work of the Technical Regulations Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations and also to consider Appendix A.

Committee 5 - Frequency Allocations Committee

Chairman:	Mr. M. HARBI (Algeria)
Vice-Chairman:	Mr. J. J. HERNANDEZ-G. (Mexico)
Secretary:	Mr. M. SANT
U.S. Spokesman:	Mr. W. R. TORAK
Terms of Reference:	To consider proposals concerning the following Articles:

Article N1, Terms and Definitions (Sections II-IV); Section II, Radio Systems; Section III, Terrestrial Radio Systems, Services and Stations; Section IV, Space Radio Systems, Services and Stations and Radio Astronomy;

Article N5, General Rules for the Assignment and Use of Frequencies;

Article N6, Special Agreements;

Article N7, Frequency Allocations;

Article N8, Special Rules for the Assignment and Use of Frequencies;

Article N28, Section I, Broadcasting Service;

Article N29, Fixed Service;

Article N47, Special Rules relating to the Use of Frequencies in the Aeronautical Mobile Service;

and the related Appendix 24.

To consider as appropriate to the work of the Frequency Allocations Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 6 - Regulatory Procedures Committee

Chairman: Mr. M. JOACHIM (Czechoslovakia)
Vice-Chairman: Mr. E. J. WILKINSON (Australia)
Secretary: Mr. R. PLUSS
U.S. Spokesman: Mr. F. S. URBANY
Terms of Reference: To consider proposals concerning the coordination, notification and registration of frequency assignments, and the activities of the IFRB and, in particular, proposals concerning the following Articles:

Article N9, Co-ordination, Notification and Registration of Frequencies - International Frequency Registration Board, General Provisions;

Article N10, Internal Regulations of the International Frequency Registration Board;

Article N11, Co-ordination of Frequency Assignments to Stations in a Space Radiocommunication Service except Stations in the Broadcasting Satellite Service and to appropriate Terrestrial Stations;

Article N12, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Terrestrial Radiocommunication Stations;

Article N13, Notification and Recording in the Master International Frequency Register of Frequency Assignments to Radio Astronomy and Space Radiocommunication Stations except Stations in the Broadcasting Satellite Service;

and the related Appendices 1, 1A and 1B.

To consider proposals concerning regulatory measures against harmful interference covered by the following Articles:

Article N18, International Monitoring;

Article N19, Reports of Infringements;

Article N20, Procedure in a Case of Harmful Interference;

and the related Appendices 6, 7, 8 and 9.

To consider as appropriate to the work of the Regulatory Procedures Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 7 - General Administrative Committee

Chairman: Mr. P. O. OKUNDI (Kenya)
Vice-Chairman: Mr. H. L. VENHAUS (Fed. Rep. of Germany)
Secretary: Mr. A. ZACCAGNINI
U.S. Spokesman: Mr. W. LUTHER
Terms of Reference: To deal with proposals on general administrative matters not covered by other Committees, and in particular to consider proposals concerning the following Articles:

Article N1, Terms and Definitions, Section I, General Terms;

Article N21, Secrecy;

Article N22, Licences;

Article N23, Identification of Stations;

Article N24, Service Documents;

Article N30, Amateur Service and Amateur Satellite Service;

Article N31, Standard Frequency Service and Time Signal Service;

Article N32, Experimental Stations;

Article N33, Radiodetermination Service and Radiodetermination Satellite Service, Sections I, II, III and IVA;

Article N39, Special Services relating to Safety;

Article N73, Effective Date of the Radio Regulations;

and the related Appendices C, 9, 10 and 23.

To consider proposals on the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions.

To suggest to the Plenary Meeting, taking account also of the advice of the other Committees, a programme of future Administrative Radio Conferences to deal with specific services with a view to presenting advice on such a programme to the ITU Administrative Council for subsequent submission to the Plenipotentiary Conference.

To consider Resolution No. Sat-4 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977, and to take such action as may be considered necessary.

To consider as appropriate to the work of the General Administrative Committee the resolutions and recommendations adopted by previous Administrative Radio Conferences and to take such action as may be considered necessary including the adoption of any new resolutions and recommendations.

Committee 8 - Restructure Committee

Chairman:	Mr. O. LUNDBERG (Sweden)
Vice-Chairman:	Mr. G. I. WARREN (Canada)
Secretary:	Mr. J. PELEGRI
U.S. Spokesman:	Mr. D. ANDERSON
Terms of Reference:	To consider the specific proposals concerning the basic re-arrangement of the Radio Regulations and the Additional Radio Regulations, and the further refinement and deletion of superfluous or redundant provisions in Articles N34 - 38, N40 - 46 and N48 - 72, as well as any consequential amendments

concerning those Articles, related Appendices, Resolutions and Recommendations including the adoption of any new resolutions and recommendations.

To consider proposals based on the CCITT studies carried out in accordance with Resolutions Nos. Mar2-22 and Mar2-23 and to take such action as may be considered necessary.

Committee 9 - Editorial Committee

Chairman:	Mr. P. BASSOLE (France)
Vice-Chairmen:	Mr. V. QUINTAS (Spain) Mr. D. E. BAPTISTE (United Kingdom)
Secretary:	Mr. R. MACHERET
U.S. Spokesman:	Mrs. Ann ALDRICH
Terms of Reference:	To perfect the form of the texts of the Final Acts without altering the sense.

C. Ad Hoc and Working Groups: A complete listing of groups below the committee level, including the chairman, U.S. spokesman and terms of reference is given in Annex C.

VI. GENERAL ATMOSPHERE OF THE CONFERENCE

A. The 1979 WARC was the first general conference to be held in twenty years. There were many important issues and requirements to be treated under its agenda and in many cases they involved direct conflict of objectives among the ITU Members. The membership of the ITU had increased 60% since 1959, entirely through the addition of developing countries. The WARC itself, as well as several key issues, were actively discussed in various non-aligned and developing country forums. In view of these facts, the U.S. and most other participating countries expected the 1979 WARC to be different from and more difficult than its predecessor in 1959 and the more recent specialized radio conferences.

B. Some observers had predicted an all-out North-South political confrontation. Concern was expressed that the ITU would go the way of other U.N. Specialized Agencies and become a forum in which international agreement on tangible objectives is replaced by ideological, confrontational debate. Of special concern was the fear that WARC would take up the debate of the so-called New World Information Order (NWIO). Such a course would divert the Conference from its proper task and impede constructive negotiation on the concrete objectives of radio spectrum regulation. The record speaks for itself. There was no rhetorical debate over a NWIO, and in general, very little political discussion that was not directly relevant to the technical, economic and operational tasks which had been assigned to the Conference. For example, the political issues of direct broadcast satellite and remote sensing currently being discussed in the U.N. Outer Space Committee never came up during the WARC. It is significant that two-thirds of the political position papers prepared in advance for Delegation use in Geneva were never used since the issue did not arise. However, some of the broader North-South political tensions that underlied the New Information Order debate were present throughout the Conference, surfacing in various ways.

C. The most difficult issue of this type involved the selection of a Conference Chairman. In the year or more preceding the opening of the Conference, widespread support had developed for Derek Rose of New Zealand as Conference Chairman. His name had been mentioned at the various Regional Preparatory Seminars prior to the Conference and his candidacy was endorsed by the United States. There was no opposition to Mr. Rose until several months prior to the WARC when the Indian Administration began pushing for their own representative, T. V. Srirangan, as Chairman. In an unprecedented move for ITU radio conferences, the Indian Government pressed his candidacy through diplomatic channels. In early September 1979, India's candidate obtained support at the Havana Non-Aligned Summit Meeting in the form of a resolution calling for a non-aligned country chairman of the WARC. India continued to seek support for their candidate at various non-aligned, Arab, African and Latin American meetings held in Geneva during the two weeks immediately prior to the Conference.

Several days before the opening date, it became obvious to the U.S. and other key delegations, and to ITU officials, that a serious problem was developing. For the first time, the ITU might be forced to vote for the chairman of a conference. Much more troublesome was the fact that the vote would be made along political and ideological lines which would jeopardize the possibility for a successful conference in the scheduled ten week duration. The U.S. firmly maintained its position that the slate of conference officers must be adopted by consensus, thereby indicating acceptance by all participating administrations. In an effort to seek a consensus candidate, an informal meeting of about ten heads of delegation representing all ITU Regions and regional groups, including the coordinator for the non-aligned caucus, was held the day before the scheduled opening date for the Conference. Neither India nor New Zealand attended. The group unanimously agreed to a consensus slate headed by Henry Kieffer of Switzerland.

It is customary at ITU conferences for the heads of delegation to meet on the first morning of the conference to agree to a slate of officers that would be presented to the opening plenary session in the afternoon. Tradition was broken at the 1979 WARC to allow a morning meeting of the non-aligned group. At this meeting, India was successful in having the consensus slate rejected and maintaining non-aligned support for their candidate, thereby guaranteeing a delay in the start of the Conference. The next few days saw an intensive, continuous round of negotiations by a handful of key individuals, while the vast majority of delegates could do nothing but wait for the Conference to begin. An informal group of about fifteen countries, including India and New Zealand, was organized to provide the focal point for negotiations. Many informal meetings of regional and ideological groups, including a group of Western countries in which the U.S. actively participated, were held during this period. The breakthrough came when the Latin American group was asked to provide a candidate for Chairman since the non-aligned, Arab and African groups would not propose a name acceptable to the Western group. The resulting compromise included Severini of Argentina as Chairman, proposed not as a non-aligned candidate but as a Latin American, and Kieffer as a special Vice-Chairman to coordinate the activities of Committees 4, 5 and 6. The 1979 WARC held its first plenary three days later than intended, adopting the proposed slate by consensus.

D. On other issues the situation regarding North-South relations was considerably more complex. A few developing countries clearly arrived at the Conference with a confrontational attitude. Their rhetoric at non-aligned preparatory meetings and in various regional forums gave an early indication that they were set to do battle at the Conference. While their numbers were few, their voices were often heard and influential. The majority of developing nations apparently were not looking for a confrontation and indeed generally remained silent in debates. Nevertheless, there appeared to be a feeling among developing nations that their solidarity must be maintained. It was only through the traditional ITU concept of reaching decisions by consensus rather than mere majority rule, combined with delegation perseverance in seeking solutions acceptable to all Members, that bloc voting was not more prevalent. The Delegation found the majority of developing country representatives willing to work with us on many issues, and received support from many of them on a wide variety of issues, both orally in the conference sessions and behind the scenes.

E. There were several general principles that appeared to characterize the positions taken by developing countries throughout the Conference. An obvious objective was to gain preferential treatment for themselves as shown, for example, in the Algerian proposal to give priority to developing countries in 70% of the HF fixed bands. This principle was also evident in a number of resolutions, recommendations and specific changes to the regulations where the Conference recognized the special needs of developing countries. Closely related was the forceful and relatively successful effort by developing countries to achieve a guarantee for access to congested frequency bands and geostationary orbit resources. WARC took initial steps in this direction in its adoption of resolutions calling for planning of the HF broadcasting bands and of the space services and use of the geostationary orbit.

F. In the area of allocations, developing countries typically refused to recognize or appreciate the requirements and existing investments of certain advanced systems such as U.S. military radar, and in some cases attempted to eliminate or reduce the allocation provisions. At the same time, they refused to accept even small changes in many bands that might have any effect on their existing operations. Another general trend that caused some difficulty was the obsession by many developing nations to add Fixed and Mobile Services to allocations in the higher bands up to 30 GHz. This tendency was a primary contributing factor to the large increase in the number of footnotes in the Table of Frequency Allocations. Finally, a constant source of exasperation in the North-South relationships was the unwillingness of the developing nations to link decisions on various issues or accept the notion of a "package deal". When attempts were made to establish linkage between U.S. concessions in one area to developing country concessions in another, their usual reply was that the advanced nations had the necessary technology to find some other solution. It eventually became clear that the major hope for gaining acceptance of some U.S. positions was to remain firm in detailed negotiations. This approach proved to be successful in certain situations where developing countries were reluctant to show any willingness to compromise.

G. East-West relations were remarkably good throughout the Conference, due mainly to two factors. First, the Chairman and Vice Chairmen of the Delegation had met twice with their counterparts on the Soviet Delegation before the opening of the Conference (Moscow, in September 1978 and Washington, in May 1979). These meetings were useful in establishing a rapport as well as giving both sides a clearer understanding of each country's position. Second, the state of telecommunications development of both nations, especially in the higher frequency bands, has many similarities. We naturally share like concerns in space activities and our defense communications requirements are roughly the same. The ability to work together, therefore, grew out of a common technical perspective of our communications needs in the future, reinforced by a strong desire on both sides to preserve the essential structure of the ITU.

VII. REPORT OF THE WORK OF THE COMMITTEES

A. Work of Committee 1 - Steering Committee

1. According to the usual practice, the Chairman of the Conference served as Chairman of the Steering Committee with substantial assistance and advice from the Secretary General of the Union. The Vice-Chairmen of the Conference and the Chairmen and Vice-Chairmen of all other committees made up the balance of the membership.

2. Committee 1 met each Thursday at the end of the day to consider matters relating to the direction of the Conference, such as deciding on the meeting schedule for the following week and on the need for weekend and evening meetings. The main decision of the Committee concerned the need to extend the Conference for several days. Otherwise, activities were uneventful. In accordance with custom, attendance was limited to the membership and the ITU staff designated as conference advisers and committee secretaries. No agenda or minutes were published.

B. Work of Committee 2 - Credentials Committee

1. The Committee established Working Group 2A to examine in detail the credentials deposited at the Conference. The Chairman and Vice-Chairman of the Committee and delegates from Algeria, the Federal Republic of Germany, Colombia, Hungary and Thailand participated in the Working Group, which met three times during the Conference. There were no political issues raised at the Working Group level.

2. Summary of Results:

a. Committee 2 met two times during the Conference. At its final meeting it found the credentials of 126 delegations (including the U.S.) to be in order and since they had ratified the Malaga-Torremolinos Convention, they could vote and sign the Final Acts of the Conference. Another two delegations — Bolivia and Panama — deposited provisional credentials found to be in order; therefore they could vote but not sign the Final Acts.

b. The following nine countries submitted valid credentials, but either had not ratified the Convention or were over two years in arrears on payments to the ITU; these delegations could not vote, but they could sign the Final Acts:

Guatemala
Democratic Kampuchea
Liberia
Mauritania
Nicaragua
Sierra Leone
Sudan
Chad
Zaire

c. The following six countries did not deposit credentials; these delegations could neither vote nor sign the Final Acts:

Central African Republic
Djibouti
Dominican Republic
Maldives
Mauritius
Nauru

(Note: the inconsistency between the number of countries given in this section and the number appearing in Part IV (Participation) and Annex A arises because the Kingdom of Tonga submitted valid credentials, yet did not participate in the Conference or appear on the final list of participants.)

3. There were only two political controversies regarding credentials, and they were raised in Committee 2 rather than Plenary.

a. The credentials of Democratic Kampuchea (CBG) were attacked by several delegations. Hungary questioned the validity of CBG's credentials on the basis of Article 67 of the Convention and that their Foreign Minister had signed them in New York, rather than in Kampuchea. The ITU legal advisor ruled that the place of signing was immaterial. Cuba, supported by Nicaragua, questioned the credentials and participation of the Kampuchean delegation. The USSR, DDR, Poland, Ukraine, Mongolia, Byelorussia and Bulgaria strongly protested the acceptance of CBG's credentials. Supporting the validity of Democratic Kampuchea's credentials were China, Thailand and the United States. The U.S. Delegation made it quite clear that it was only endorsing the validity of the credentials and not inferring support for either the Pol Pot or Heng Semrin regimes. In the end, the credentials of Democratic Kampuchea were accepted, although they could not vote for reasons given in 2b above.

b. The second political problem involved a challenge by the USSR delegate to the legitimacy of certain FRG delegation members who resided in West Berlin. They put forth the specious argument that under the Quadripartite Agreement (QA) these individuals were not allowed to represent the FRG. The USSR was supported by most of their allies in Eastern Europe. The U.S. Delegation made a statement, coordinated with the FRG and the UK, which pointed out the USSR had made incomplete and misleading reference to the QA, and went on to quote the appropriate passage of the Agreement to support our position. The FRG also vocally supported our statement in the Committee 2 meeting. In the end, the Committee took note of the USSR's concern, but supported the U.S. position.

C. Work of Committee 3 - Budget Control Committee

1. The Committee met six times, noting at its last meeting that no delegation had presented any criticisms of the organization and facilities available to the delegates.

2. The Conference budget approved by the Administrative Council at its 33rd (1978) and 34th (1979) Sessions provided 5,234,000 Swiss francs for the work of the Conference itself (1979 budget) and 240,000 Swiss francs for finalization work (1980 budget), for a total of 5,474,000 francs. The Committee also noted that the Conference budget did not include expenses relating to common services, which are now charged to a special section of the ordinary budget. The portion relating to the 1979 WARC in this section was estimated at 3,026,600 Swiss francs.

3. The Committee's final report, approved by Plenary on November 28, indicated a total estimated expense of 5,378,000 francs for the work of the Conference. The estimated excess of 144,000 francs was approved by the Plenary. All of the excess expenditure was due to the extension of the Conference for six days. It is commendable that other expenses were held to the budgeted amounts, despite the much larger volume of documentation than predicted and the many additional interpretation days which had to be provided.

4. Following the Conference, the Secretary General reported that actual expenses for the Conference amounted to 5,318,917.25 Swiss francs and the actual excess expenditure was only 84,917.25 francs.

D. Work of Committee 4 - Technical Regulations Committee

1. The work of Committee 4 was divided among three major Working Groups: 4A - Definitions and Nomenclature; 4B - Space/Terrestrial Sharing and Coordination Problems; and 4C - All Other Technical Standards. The excellent Report of the CCIR Special Preparatory Meeting was used extensively during the work of the Technical Committee. U.S. objectives met with great success in this area. The only major U.S. technical proposal that was not adequately accommodated by the Conference dealt with the 10 dB relaxation of the broadcasting satellite power flux density limit in the 2.5 GHz band.

2. The United States objectives with respect to the technical regulations were governed by the following general principles: changes to the Radio Regulations should result in more efficient spectrum and orbit utilization, and a flexible approach should be used to meet the needs of all administrations. A summary of our specific objectives and the Conference results is as follows:

a. Technical Terms and Definitions

The U.S. position was that changes to definitions in the Radio Regulations should be minimized unless they are essential. Therefore, the only changes proposed were to the terms dealing with coordination distance, contour, and area to recognize the procedures relevant to the Mobile Satellite Service contained in our proposed new Appendices 28A and 28B. The Conference did not accept the definition changes after rejecting the new Appendices.

The Technical Committee spent substantial time, however, in their consideration of the definitions contained in Sections V and VI of Article N1. The overall structure and organization of Article N1 was changed by the Conference. Committee 4 adopted many new definitions, most of which came from the SPM Report and other CCIR work. In a new section entitled Frequency Sharing, four new terms were defined, i.e., interference, permissible interference, acceptable interference, and protection ratio. There was considerable discussion on the term harmful interference in relation to permissible interference, but the former was approved without substantial change. Twelve new definitions were adopted in the section dealing with emissions and equipment characteristics, including terms for radiation, emission, class of emission, single sideband emission, out-of-band emission, and unwanted emission. The first two were the subject of intense discussion as to their use, appropriate meaning and suitable texts for the three languages. Regarding technical terms relating to space, new definitions were adopted for active sensor, passive sensor, and geostationary satellite orbit. Some terms were modified including a change of passive satellite to reflecting satellite and expansion of the definition of geostationary satellite. The Committee did not have sufficient information to decide on definitions for service area, coverage area, and channel, and therefore adopted recommendations for CCIR study of these terms.

Article N2 concerning Nomenclature of the Frequency Bands remained essentially unchanged. There was a strong effort to expand the list of bands up to 3,000 THz (THz equals 10^{12} Hertz) for reference purposes, noting that optical systems are being considered above the upper limit of 3,000 GHz now shown in the list. This proposal was rejected for the Regulations since sufficient guidance is given in the CCIR texts.

b. Classification and Designation of Emissions and Necessary Bandwidth

Within the existing Radio Regulations, Article N3 and Appendix B required the use of three symbols to classify and describe the emission, preceded by the necessary bandwidth in kilohertz. Because these provisions for designating emissions were adopted at a time when many of the present complex signals were not yet in use, they did not provide the means for expressing all of the information necessary to describe the newer emissions. Furthermore, the emission designator is important in the evaluation of interference potential since it is the only information available in some cases by which the purpose and content of a signal can be determined.

The CCIR had considered all emissions and characteristics requiring classification and had developed a detailed procedure for the designation of emissions. This procedure, contained in Recommendation 507, was adopted by the CCIR XIVth Plenary (Kyoto, 1978) and forwarded directly by that Plenary Assembly to the 1979 WARC. This Recommendation was also accepted by the SPM and was contained in the U.S. proposals to the Technical Committee, together with necessary changes to Appendix 5. However, the SPM expressed concern that the Appendix would not reflect current technology. In addition, examples were incomplete for composite emissions (A9, F9 and P9) whose numbers and complexity have increased significantly. Therefore, the SPM agreed that this matter requires further CCIR study and noted that necessary bandwidth may be determined by any one of three ways, viz., use of the revised Appendix 5, computation in accordance with CCIR Recommendations or by measurement. The SPM also considered that the revised emission designation procedure adopted for Appendix 5 by the 1978 CCIR Plenary is appropriate. These were contained in our proposals to the WARC.

The Conference adopted the CCIR Recommendations and therefore the U.S. proposals for the classification and designation of emissions for Article N3 and Appendix 5. The new method provides a more precise and descriptive way of specifying transmissions, allowing more efficient use of the spectrum by improving international frequency registration techniques and more accurate determination of interference potential when planning new systems in shared frequency bands. The CCIR was requested in new Recommendations K and M to continue their study of these issues.

Committee 4 also adopted Resolution AK which directs the IFRB to prepare and publish, not later than October 1980, explanatory information to help implement the new method. Conversion of the Master Frequency Register to the new designation system is to begin as soon as administrations begin forwarding necessary data. This exercise will be one of the first tasks that the responsible U.S. agencies will have to undertake.

c. Technical Characteristics

Article N4 contained several basic regulations which were applicable to transmitting and receiving equipments. Changes were proposed to enhance spectrum efficiency by urging the use of new technology, including for the first time guidelines for receiving equipment, as set forth in relevant CCIR Recommendations. The SPM results supported these modifications. Specific improvements were proposed in Appendices 3 and 4 which are discussed below.

d. Frequency Tolerances of Transmitters

Frequency tolerances of transmitters in many instances affect the efficiency with which radio spectrum is used as well as the design, cost, and operation of radio systems. Appendix 3 and Article N4 of the Radio Regulations established the frequency tolerances for transmitters. The tolerances were developed for equipment that had been in use for many years. Advances in technology, increases in costs of equipment, and differences in method of operation suggested the need for changes to the criteria on which the tolerances were developed. Hence, the U.S. undertook a comprehensive study of the frequency tolerances for the various types of equipment in use. During the development of the proposed tolerances, the study recognized the influence that a new tolerance would have on spectrum efficiency and took into account the economic and operational cost associated with such changes. Also, it was considered important that new restrictive tolerances not be based solely on the state of the art of the equipment. In some instances, the improvement of spectrum efficiency was not great enough to offset the cost of making the transition and in those cases the tolerances were not proposed to be changed. The U.S. presented the results of this study and associated justifications for the proposed changes to the SPM and nearly all were accepted. The U.S. proposal to the WARC was to revise Appendix 3 using values in the SPM Report.

Values of frequency tolerances recommended by the SPM were essentially adopted without change by the 1979 WARC. A few tolerance values were relaxed internationally although there was a strong tendency to stay exactly with the SPM values. In one case, however, a frequency tolerance tighter than the SPM recommendation was adopted, which will affect U.S.-licensed transmitters in the Land Mobile Service operating with 2 watts or less (generally walkie-talkies). This involves the band 235-470 MHz where a frequency tolerance of 15 parts per million was decided for portable equipment with mean output power of 5 watts or less. The present U.S. tolerance for some services in this band is 50 parts per million. The new tolerance value takes effect for all new transmitters after January 1, 1985 and for all 5 watt or less transmitters after January 1, 1990.

e. Spurious Emission Tolerance Levels

Spurious emission levels of transmitters have a definite relationship to the severity of unwanted interference signals that affect the operation of radio equipment in any electromagnetic environment. The reduction of these spurious emission levels can contribute significantly to the reduction of harmful interference from both in-band and out-of-band unwanted signals. The Table of Tolerances for the Levels of Spurious Emissions contained in Appendix 4 provided tolerances for transmitters operating below 235 MHz; for bands above this frequency, the U.S. believed that spurious emission levels should be as low as practicable.

The CCIR adopted a study program on this matter in which the U.S. took an active lead. The results of this effort were discussed at the SPM and acceptable conclusions were agreed as far as they went. Specifically, the SPM Table of Maximum Permissible Levels of Spurious Emissions ends at 960 MHz. The U.S. considered it important to extend the table upwards to 17.7 GHz. The inclusion of satellite operations in this frequency range was particularly important because of (1) the potential impact of satellites on terrestrial and other satellite communications systems; (2) the general inability to reduce or eliminate spurious emissions from launched satellites short of turning off the equipment; and (3) the expense associated with satellite operations. Based on data taken from satellite and other transmitter users and on an assessment of technology now under development, it was believed that a value of 50 dB below the mean power of the fundamental emission, without exceeding 100 milliwatts, was appropriate for all cases except for intermodulation problems associated with earth and space station emissions. For this case a value of 30 dB below the saturated transmitter output power without a 100 milliwatt limit was appropriate pending further CCIR study.

The U.S. proposal to the WARC therefore was to modify Appendix 4 in accordance with the SPM Report. In addition, the U.S. proposed that specific values be adopted for the frequency range between 960 MHz and 17.7 GHz. The 1979 WARC adopted changes to Appendix 4 and extended the table up to 17.7 GHz in accordance with our proposals. This decision increases the previous international upper frequency limit from 235 MHz except in the special case of stations in the space services and systems using digital modulation techniques in the bands above 960 MHz which require additional study. New Recommendation L requests the CCIR to carry out these studies as a matter of urgency. The higher frequency limit is not effective until 1994. There were essentially no changes below 235 MHz requiring specific U.S. action.

f. Interference and Tests

The Regulations on interference and tests were deemed sufficient and adequate by the U.S. Therefore, our proposal to the Conference was to maintain Articles N16 and N17 without modification. The Conference adopted minimal changes to these Articles. One new provision states that special consideration should be given to avoiding interference on the distress and safety frequencies. Another decision established a new section dealing with industrial, scientific and medical (ISM) equipment which was defined in Article N1. The new ISM provision was based on the existing regulation for industrial interference, and states that radiation from ISM equipment shall be minimal and that radiation shall not cause harmful interference to radiocommunications services outside of the bands designated for ISM use.

g. Terrestrial Services Sharing with Space Services

The increasing use of space services to satisfy the communications requirements of the world was recognized with the addition of new satellite service allocations and the consequential increases in sharing between space and terrestrial services. For shared frequency bands in the range 1-40 GHz, both the SPM Report and the U.S. proposals maintained essentially a status quo for Article N25 with respect to the direction of maximum radiation and the maximum equivalent isotropically radiated power (eirp) from stations in the Fixed and Mobile Services. For frequency bands above 40 GHz the population density of the terrestrial and space services in shared bands was not extensive, nor were the characteristics of equipment sufficiently known to warrant proposals for sharing criteria.

The Conference maintained the values for pointing restrictions without change in the bands 1-10 GHz and 10-15 GHz. For the bands above 15 GHz no pointing restrictions for the Fixed and Mobile Services were adopted in spite of pressure to do so. However, a footnote provision states that when the CCIR has made a recommendation as to the need for restrictions above 15 GHz, all systems introduced after January 1, 1982 should as far as possible meet such restrictions. Power limits for the bands 1-10 GHz and above 10 GHz were maintained without change. Appropriate changes were made in the list of specific bands to take into account changes in the Allocation Table, although the limits in the bands available to feeder links for the Broadcasting Satellite Service (i.e., 10.7-11.7 GHz, 14.5-14.8 GHz and 17.7-18.1 GHz) were made provisional pending further CCIR study. In recognition of the equality of right to operate when different services are allocated in adjacent regions, a footnote provision urges administrations to observe any limits concerning inter-regional interference which the CCIR may adopt.

h. Space Services Sharing with Terrestrial Services

In general, the U.S. proposals and the SPM Report maintained the status quo for all power flux density (pfd) values in Article N26. The single exception in the U.S. proposals concerned the Broadcasting Satellite Service allocation at 2.5 GHz. Appropriate changes were, of course, necessary to add or delete specific bands to the applicable power limit to reflect decisions taken on the Table of Frequency Allocations.

In the band 2500-2655 MHz, the Broadcasting Satellite Service (BSS) and the Fixed Satellite Service (FSS) (space-to-earth), as proposed for Region 2, would share the frequency band with the terrestrial Fixed and Mobile Services. The Regulations in Article N26 provided a higher power flux density limit for BSS than for FSS. The U.S. proposed that the pfd limit for these two services be the same in this frequency band, believing that there was no justification for burdening the Fixed Satellite Service with a lower pfd limit if it must operate within the same environment as the Broadcasting Satellite Service. In addition, it was envisioned that BSS in this frequency band would develop using earth stations with small diameter antennas (about 1 meter) at least for domestic use as demonstrated by the ATS-6 experiment. Hence, the United States further proposed that the existing Broadcasting Satellite Service pfd limit be relaxed by 10 dB and be applied to both BSS and FSS. This would accommodate the smaller diameter earth terminals.

The U.S. Delegation encountered surprisingly strong opposition to our proposals for BSS and FSS power limits in the 2.5 GHz band. An extensive effort was made to explain the issue to other delegates, including the distribution of a formal document on the subject. Support of the developing countries was sought on the basis that the changes proposed were particularly beneficial for low capacity integrated BSS/FSS systems such as that demonstrated in the SITE project using the ATS-6 satellite. This effort was not successful. After extensive discussion with many administrations, the Conference rejected the proposal for a 10 dB relaxation of the pfd applicable to the Broadcasting Satellite Service. It was possible to align the pfd limits for the Fixed Satellite Service to those which currently exist for the BSS (this represents a 2 dB relaxation at high elevation angles and 7 dB at low angles). In addition, pfd limits were adopted to reflect changes to the downlink allocations for the FSS, which were extended from 2500 MHz to 2690 MHz in Region 2 with the upper 35 MHz allocated for bidirectional use.

The Conference maintained all other power flux density limits in Article N26 without change. New pfd limits were adopted for the band 31-40.5 GHz on a provisional basis pending further CCIR study. As in the case of Article N25 a footnote provision was adopted urging administrations to observe any limits concerning interregional interference which the CCIR may adopt, in recognition of the equality of right to operate between Regions.

i. Special Rules for Space Services

One area in which the Conference could improve the utilization of the geostationary orbit was in the regulations specifying the accuracy of spacecraft stationkeeping and antenna pointing. The subject of stationkeeping was discussed at the

SPM and its Report concluded that it is now technically feasible for new geostationary satellites to be controlled in longitude plus or minus 0.1°. The U.S. supported this conclusion in its proposals and also proposed tightening the pointing accuracy requirement to plus or minus 0.1°.

Committee 4 adopted stationkeeping requirements proposed by the U.S. for the FSS and BSS services. Longitude capability and maintenance was changed from plus or minus 1° to plus or minus 0.1°. Experimental stations and space stations in services other than FSS and BSS need maintain their position only within plus or minus 0.5°. A grandfather clause provides that space stations in service before January 1, 1987 and advance published before January 1, 1982, may comply with the existing values but should make an effort to achieve a maintenance capability of plus or minus 0.5°. Pointing accuracy requirements were increased but not to the extent desired by the U.S. The Conference adopted values of plus or minus 0.3° or 10% of the half-power beam width, whichever is greater, for all geostationary satellites.

Another item of interest in Article N27 is the priority given to FSS geostationary satellites over non-geostationary satellites. Some administrations wanted this priority to be extended to all space services but the U.S. successfully opposed the idea because of its overly restrictive impact on non-FSS services. A new section relating to Radioastronomy in the shielded zone of the Moon was added to the Article. The new provisions prohibit emissions causing harmful interference to radioastronomy observations on the far side of the Moon in the entire frequency spectrum, except for bands allocated to or used in support of the Space Research Service.

j. Aeronautical Radiobeacons

A requirement to increase the protection ratio for aeronautical radiobeacons operating in the LF/MF range was identified by the International Civil Aviation Organization (ICAO) and supported by the U.S. For some time, these beacons had been protected in practice at a 15 dB level, instead of the 10 dB as indicated in Article N33. At the ICAO Communications Divisional Meeting in the Spring of 1978 it was unanimously agreed that the Radio Regulations should be changed to provide a protection ratio of 15 dB. This action was taken by the 1979 WARC.

k. Determination of Coordination Areas

The U.S. proposed to simplify the calculations of Appendix 28 which specify the procedure for determining the coordination area around an earth station. As written, Appendix 28 calculations were complex and were based upon permissible interference power. For earth stations dedicated to reception of video or digital (excluding telephony) transmissions, reception quality could be based upon an acceptable received carrier-to-interference (C/I) ratio. The use of an alternative procedure based upon an acceptable C/I ratio would considerably simplify the calculations.

The 1979 WARC modified Appendix 28 to permit simplified calculations for determining the coordination area around an earth station. Although a procedure specifically based on C/I ratio was not adopted as proposed by the U.S., such a procedure is now permitted for optional lower protection for receiving earth stations. An administration is free to use any procedure it wishes to calculate coordination contour to protect transmissions to its earth stations provided that the coordination contour is smaller than that which would result from normal Appendix 28 calculation methods. However, when a smaller coordination contour is based upon a procedure other than the procedure contained in Appendix 28, the notifying administration shall indicate in detail the nature of such procedures. If an administration later decides to protect its receiving earth stations through notification of a coordination contour which is greater than the one it had notified under a departure from Appendix 28, it must re-coordinate the earth station.

The Technical Committee also modified Appendix 28 to include propagation data from CCIR Reports, but with significantly and arbitrarily reduced cutoff distances. This may pose a problem in the future with respect to overland paths. In addition, the Conference adopted Resolution AJ providing an update of the Appendix 28 propagation data following each future CCIR Plenary Assembly (approximately every four years). Changes to the Appendix would be adopted at the next scheduled WARC under an extraordinary agenda item.

In recognition of the growing use of mobile satellite systems, the U.S. proposed a procedure in new Appendix 28A for determining the coordination area above 1 GHz associated with the operation of mobile earth stations. By building upon procedures contained in Appendix 28, provisions contained in the new Appendix 28A would permit the calculation of a coordination area around the service area within which it is desired to operate a mobile earth station. Whereas the coordination of an earth station in the Fixed Satellite Service was for a single site or one geographic location, coordination of an earth station in the Mobile Satellite Service would permit the mobile earth station to operate at any location within the specified service area. Additionally, a new Appendix 28B was proposed that provides an optional procedure for determining the protection area around a terrestrial station located within the coordination area of an earth station in the Mobile Satellite Service.

U.S. proposals relating to mobile satellite earth station coordination procedures were introduced into the Radio Regulations in modified form. The Final Acts incorporate the philosophy contained in the proposed Appendix 28A into Section 7 of Appendix 28 which provides recognition of a specialized coordination area. The proposed Appendix 28B met with strong opposition and was rejected. Additionally, Regulation No. 4139 was modified to note mobile earth stations, as well as stating that the coordination procedures "shall be subject to agreement . . . between the administrations concerned". In this way, modifications to Appendix 28 and Regulation No. 4139 achieved the U.S. goals.

l. Coordination between Satellite Networks

Appendix 29 prescribed procedures for determining when coordination between satellite networks was necessary. In general, the approach provided in Appendix 29 was considered adequate. However, experience in applying these provisions indicated that the specified 2% increase in noise temperature was too conservative and led to the initiation of coordination in an unnecessarily large number of cases. In order to reduce the number of instances where coordination is required, the U.S. proposed that the increase in noise temperature criteria be revised upward to 3%. This was consistent with the conclusions of the SPM Report on this issue. The U.S. also proposed to change the title of the Appendix, to clarify that the procedure serves as a "trigger" to determine when the coordination should be initiated rather than a method to determine the degree of interference.

The Conference raised the noise temperature criteria for determining if coordination is required between geostationary satellite networks to 4% from the existing 2% value which is consistent with U.S. efforts to minimize the number of situations where coordination is required. The title of the Appendix also was modified in line with the U.S. proposal to more accurately indicate the purpose of the Appendix.

Other changes to Appendix 29 were acceptable to the U.S. They include new provisions for reversed-frequency band usage and the concept of a single link (up or down). New reference antenna radiation patterns were adopted. The Delegation successfully opposed proposals for the automatic use of polarization isolation and for a special calculation method to protect single channel per carrier (SCPC) from artificially dispersed FM/TV transmissions.

m. New Recommendation

It was proposed by the U.S. that footnote 3661/332A be modified so that the band 620-790 MHz would be available to sound as well as television broadcasting in the Broadcasting

Satellite Service. Further, it was proposed that the power flux density limits be deleted. In consideration of these modifications, a new Recommendation FF was proposed replacing Recommendation No. Spa2-10 and expanding its provisions to have the CCIR study the effects of the various broadcasting satellite emissions upon the terrestrial Broadcasting Service. The SPM treated this subject and its Report supported the U.S. objectives. In Committee 5, the proposals to modify footnote 3661/332A were not accepted. The U.S. withdrew its Recommendation FF and Committee 4 adopted Recommendation No. Spa2-10 without change.

The Technical Committee also reviewed a large number of existing resolutions and recommendations, many of which were retained with little or no change. In addition, there were a significant number of new resolutions and recommendations adopted that were primarily directed to the CCIR and the need for further study.

E. Work of Committee 5 - Frequency Allocations Committee

1. Introduction

The Allocations Committee carried out its work in six main Working Groups, with responsibility for the entire Table of Frequency Allocations, the Regulations relating to the Table and the use of frequencies, and the definitions relevant to the various radio services. It considered and decided on nearly 13,000 individual proposals in the course of its work. Due to the fundamental importance of allocations, all delegations including the U.S. participated in Committee 5 more than any other, which led to well-attended meetings that were often as large as the Plenaries themselves. The work ranged from meticulous plodding through the lower bands to stormy debate concerning the Fixed Satellite Service at 3 and 4 GHz. In the end, the resulting Table of Frequency Allocations could be considered a success, even though the total of 487 footnotes represented a net increase of 117 above the number in the existing Table and notwithstanding the fact that the United States found it necessary to take five reservations on decisions made by the Committee. There were hundreds of major decisions taken over the period of the Conference and nearly all were arrived at by general consensus that was fully acceptable to the U.S. position. The overall and specific results are highly favorable to the United States. The following paragraphs provide a brief summary of our objectives and the work of the Allocations Committee.

2. Allocations in the Bands Below 4,000 kHz

a. The U.S. proposals in the Table of Frequency Allocations below 4,000 kHz were generally intended to provide increased status and protection for certain existing services and to provide additional allocations for radio services with frequency requirements that have increased since the 1959 Radio Conference, reducing other allocations appropriately. The Conference adopted many changes to the Table but it did not undergo major change. The main results, particularly in Regions 1 and 2, were to improve conditions for sharing by the Radiolocation, Radionavigation, Amateur and Maritime Mobile Services, and to expand the bands for the Broadcasting Service. The Conference confirmed the regional character of the Allocation Table below 4 MHz.

b. The first change to the Allocation Table was to move the lower limit from 10 kHz to 9 khz, supposedly to benefit radionavigation systems in the band 10-14 kHz although the U.S. did not consider it necessary. The band below 9 kHz is not allocated and the existing footnote requiring protection from harmful interference to systems in the allocated bands was retained.

c. The U.S. proposed changes to improve the allocation status of the worldwide OMEGA (10-14 kHz) and the LORAN-C (90-110 kHz) radionavigation systems. Radionavigation now has a primary exclusive allocation worldwide in the band 9-14 kHz. The band 90-110 kHz has been reserved for the primary use of the Radionavigation Service worldwide, the other services having been reduced to secondary status. This band is protected by a footnote from interference caused by emissions in adjacent bands. A footnote has also been added to improve the use of the band through coordination of the technical characteristics and of operation of the system used.

d. New primary allocations were proposed for the Aeronautical Radionavigation Service below 200 kHz and above 510 kHz to accommodate radiobeacons. Also, in agreement with the U.S. proposals and the SPM Report, shared allocations were proposed in Region 2 for aeronautical beacons and low-power broadcasting stations in the band 525-535 kHz. All proposed allocations for the Aeronautical Radionavigation Service were obtained. Secondary allocations for maritime radiobeacons were sought in the bands 275-285, 325-335, and 510-525 kHz. However, only the second band was adopted by the Conference.

e. In Region 1 between 150 and 285 kHz the allocation to the Broadcasting Service was improved by reducing the allocations to the Aeronautical Radionavigation Service. The band limits have been altered from 150-285 kHz to 148.5-283.5 kHz to permit the change of frequency of all broadcasting stations so that carriers will be multiples of the channel separation (9 kHz). Resolution BS was adopted providing that the frequency changes shall take place over a period of four years from February 1, 1986 to February 1, 1990 to ensure minimum possible interference to Aeronautical Radionavigation Service in Regions 2 and 3. Between 285 and 435 kHz in Region 1, the status of aeronautical radionavigation was improved to compensate for the reductions imposed below 285 kHz.

f. Where possible, allocation changes were proposed that take advantage of the improved performance of existing radio equipment as well as those anticipated in the future, as in the case of the reduced guard bands for the 500 kHz and the 2182 kHz mobile distress and calling frequencies. The guard band for 500 kHz has been reduced from 490-510 to 495-505 kHz. Recommendation ZZ was adopted inviting the next Mobile Services Conference to decide on the date of entry into force of the new guard band at 500 kHz. The Conference also adopted Recommendation YD providing that the use of the bands between 435 and 526.5 kHz by the Maritime Mobile Service in Region 1 shall be regulated by a plan to be prepared at that Conference. Recommendation YB calls for the next Mobile Conference to consider the possibility of allocating a frequency between 435 and 525 kHz for transmission on a worldwide basis of navigational and meteorological warnings to ships using narrowband direct-printing telegraphy.

g. The U.S. proposed that the broadcast allocations in the two bands 525-535 kHz and 1605-1615 kHz used domestically for the Travelers Information Stations (TIS) be limited to public service information and restricted to a maximum transmitter power of 50 watts. The broadcasting allocations were adopted but the Conference did not agree to the power restrictions. In the lower band, the WARC adopted a power limit for AM-broadcasting stations of 1 kw daytime and 250 watts nighttime. The upper band has become part of the new AM-broadcasting band, without power limits and subject to regional planning. Decisions will have to be made on the best way to accommodate the TIS requirement under the new allocations.

h. The U.S. proposed additional MF spectrum for broadcasting in Region 2 to permit an expansion of the number of AM-broadcasting stations in this country. Our proposal would have provided shared allocations in the band 1605-1800 kHz, and exclusive broadcasting at 1800-1860 kHz. The total spectrum available for broadcasting under this proposal would have been less than the total increase because of the need to satisfy other requirements, primarily the Radiolocation Service, in the same spectrum area. The WARC adopted a broadcasting allocation in the band 1605-1705 kHz. The use of this band for broadcasting is subject to a broadcast plan to be established by a Region 2 Conference which will take place not later than 1985. Prior to the establishment of such a plan, the band 1605-1705 kHz is allocated to the Fixed, Mobile and Aeronautical Radionavigation Services on a primary basis and to the Radiolocation Service on a secondary basis. After the plan comes into effect, the band 1605-1625 kHz will be exclusively broadcasting and the band 1625-1705 will be allocated to broadcasting on a primary basis, fixed and mobile on a permitted basis, and radiolocation on a secondary basis.

The Conference also recommended that the use of the band 1625-1665 kHz for broadcasting should not commence before July 1, 1987 and the use of the 1665-1705 kHz band for broadcasting should not commence before July 1, 1990. This phased-in approach will give administrations in Region 2 that have fixed and mobile operations in the band sufficient time to move these operations. The U.S. has substantial radiolocation operations in this band that will have to be reaccommodated over a period of time. These operations will either have to be moved or accommodated domestically on a shared basis with the Broadcasting Service. Such sharing would likely be ineffective near international borders since the Radiolocation Service is on a secondary basis.

i. The proposed broadcasting allocations at 1800-1860 kHz were not adopted by the WARC. Instead, an exclusive allocation for the Amateur Service was made in the band 1800-1850 kHz in Region 2. The Radiolocation Service was given a primary allocation at 1850-2000 kHz shared co-equally with several other services. Also, LORAN stations in Region 2 operating in the radionavigation band 1800-2000 kHz are to be discontinued by December 31, 1982.

j. In Regions 1 and 3 the limits of the bands used by the Broadcasting Service have been changed from 525 and 1605 kHz to 526.5 and 1606.5 kHz respectively. In Region 1, allocations above 1606.5 kHz to the Maritime Mobile Service have been improved. This Service is now the only primary service in Region 1 in a number of bands so that it will be possible to plan them. The bands are: 1606.5-1625 kHz, 1635-1800 kHz and 2045-2160 kHz. Also, for a number of countries in Region 1, the Maritime Mobile Service's status as the single primary service has been extended by means of a footnote to the bands 2194-2300 kHz, 2502-2625 kHz and 3155-3200 kHz. The use of these bands by maritime will also be the subject of a plan to be drawn up by the next Mobile Conference.

k. In Region 1 three bands have been exclusively allocated to radiolocation, i.e., 1625-1635 kHz, 1800-1810 kHz and 2160-2170 kHz. The use of these bands by the Radiolocation Service is subject to coordination between users and to a power limitation. Also in Region 1, the band 1810-1850 kHz has been allocated exclusively to the Amateur Service.

l. The Conference added a footnote to the Table urging administrations to authorize the use of the band 3155-3195 kHz to provide a common worldwide channel for low power wireless hearing aids designed to operate over short distances within the induction field. The footnote indicates that other channels may be assigned from the band 3155-3400 kHz to suit local needs.

m. The U.S. proposed an exclusive allocation in Region 2 for the Amateur Service in the band 3500-3900 kHz. However, the Conference only approved an exclusive band from 3500-3750 kHz. A new footnote was added to all Amateur Service bands between 3.5 and 144 MHz regarding the use of the bands in the event of natural disaster. The conditions of use for this purpose are given in new Resolution DN.

3. Allocations in the Bands 4-27.5 MHz

a. The U.S. proposed changes in the high frequency band to meet the expanding needs of the Broadcasting, Maritime, Amateur, Mobile and Radioastronomy Services with a minimum of impact on the Fixed Service, consistent with the changing role of the latter service in world communications. It was recognized that many countries will have a continuing need for HF domestic fixed communications for a number of years. It was felt that fixed satellite, microwave systems and/or cables eventually will meet requirements for dependable long distance national fixed circuits in nearly all countries.

Congestion in the high frequency broadcasting bands has reached the point where effective broadcast reception can be assured only through the use of excessive transmitter power and multiple transmitters. The increased communications traffic stemming from international trade required an increase in the allocations of the HF Maritime Mobile Service if communications were to improve shipping efficiency and decrease cost. New allocations for broadcasting and maritime mobile expansion were proposed in such a manner as to have minimum impact on the Fixed Service. The new bands were proposed to be shared with the Fixed Service which would be continued for national operations with new footnotes. This recognized the fact that the greatest continuing requirement for fixed operations is national rather than international. It was also proposed to add broadcasting allocations by the addition of footnote 3496/202 (Tropical Zone) in several of the lower HF bands. This would have the effect of allowing new broadcasting operations on a priority basis in these bands. New allocations for the Mobile (except Aeronautical Mobile (R)) Service were proposed on a shared basis in certain fixed bands to provide for mobile requirements in general.

b. The Delegation anticipated difficulties in achieving allocation increases in the Broadcasting and Maritime Services at the expense of the Fixed Service and such difficulties were experienced, particularly in the lower HF bands. Very few changes to the allocations of the Fixed Service were made below 10 MHz, as a result of the strong desire of many countries to continue to use the high frequency Fixed Services mainly for domestic communications systems. In summary, of the Fixed Service spectrum between 4 and 10 MHz, 125 kHz was reallocated. Increased sharing was provided on a primary basis in 578 kHz in Region 1, 678 kHz in Region 2 and 358 kHz in Region 3. Sharing by other services on a secondary basis has been provided in 1225 kHz in Regions 1 and 2 and 1545 kHz in Region 3. In the bands between 10 and 27.5 MHz, significant reallocations of spectrum from the fixed bands were made in favor of the Maritime Mobile, the Broadcasting and the Amateur Services. However, the band 21,850-21,870 kHz, which will be vacated by the Radioastronomy Service, has been reallocated to the Fixed Service.

c. The only significant reallocation below 10 MHz was made from the Fixed Service to the Broadcasting Service in the band 9775-9900 kHz. The availability of this band to the Broadcasting Service is dependent on the satisfactory transfer of existing fixed operations. Other changes involve increased sharing between the Fixed Service and the Maritime and Mobile Services. In particular, the Maritime Mobile Service has been added on an equal primary basis with the Fixed Service in the bands 4000-4063 kHz and 8100-8195 kHz. The U.S. Delegation found it necessary to submit reservations (see also Section XII) in the Final Protocol regarding the failure of the Conference to provide adequate allocations for the Broadcasting and Maritime Mobile Services in this part of the spectrum.

New allocations for the Mobile (except Aeronautical Mobile) or Land Mobile Services sharing with the Fixed Service have been established in several bands on a worldwide or regional basis. The allocations were made on a primary or secondary basis in the bands 4750-4850 kHz, 5060-5250 kHz, 5250-5450 kHz, 5730-5950 kHz, 6765-7000 kHz and 7300-8100 kHz.

d. Additional spectrum above 10 MHz for the Maritime Mobile Service was provided for in the bands 12,230-12,330 kHz, 16,360-16,460 kHz, 17,360-17.410 kHz, 18,780-18,900 kHz, 19,680-19,800 kHz, 22,720-22,855 kHz, 25,110-25,210 kHz and 26,100-26,175 kHz. These reallocations, which total 800 kHz, will be available under the conditions specified in Footnote 3511A, which provides for the transfer of the existing services operating in these bands in accordance with the Table of Frequency Allocations and which are recorded in the Master Register. The Conference also approved the detailed procedures and the time scale for effecting the transfer of the Fixed Service assignments. For the bands above 10 MHz, the transfer period is to be five years from July 1, 1984. The use of these bands shall also be subject to provisions to be decided by a competent WARC, and the earliest date for maritime use shall not be earlier than the satisfactory completion of the transfer of Fixed Service assignments.

e. The Broadcasting Service bands have been increased under conditions that are similar to those governing the transfer of bands to the Maritime Mobile Service. A total of 725 kHz of new spectrum is to become available to the Broadcasting Service in the bands 11,650-11,700 kHz, 11,975-12,050 kHz, 13,600-13,800 kHz, 15,450-15,600 kHz, 17,550-17,700 kHz, and 21,750-21,850 kHz. Footnote 3510A sets out the conditions under which the above bands may be used by the Broadcasting Service. This Footnote also refers to the band 9775-9900 kHz reallocated to the Broadcasting Service below 10 MHz. The same transfer time period mentioned above for the Maritime Mobile Service applies to the Broadcasting Service. For the band below 10 MHz, the transfer period is to be ten years from July 1, 1984. The use of these bands is also subject to provisions to be decided by the WARC for Planning HF Bands Allocated to the Broadcasting Service, called for by Resolution DI.

f. The Amateur Service was allocated additional bands at 10,000-10,150 kHz on a secondary basis, 18,068-18,168 kHz on an exclusive basis including amateur satellite, and at 24,890-24,990 kHz also on an exclusive basis including amateur satellite. The availability of the latter two bands to the Amateur Service is dependent on the completion of the satisfactory transfer of all assignments operating in these bands and recorded in the Master Register. At 7 MHz, the existing amateur band in Region 2 was not changed. The U.S. had to accept, however, a qualifying note whereby the use of the band 7100-7300 kHz in Region 2 shall not impose constraints on the Broadcasting Service intended for use within Regions 1 and 3.

g. The U.S. proposed new exclusive allocations in the 13 MHz and 25 MHz bands for the Radioastronomy Service. A primary allocation to radioastronomy in the band 13,360-13,410 kHz on a shared basis with the Fixed Service was adopted. The band 21,850-21,870 kHz will be vacated by the Radioastronomy Service which has received a new exclusive allocation in the band 25,500-25,670 kHz. The availability of the new band is dependent on the completion of the satisfactory transfer of all assignments to the fixed and mobile stations in the lower part of the band (25,550-26,600 kHz) and of the transfer of the broadcasting stations operating in the upper part to frequencies in accordance with the new plan to be established in the future HF Broadcasting Conference.

h. The existing exclusive allocations for the Aeronautical Mobile (R) Service have been maintained and the recommendation of the 1978 Aeronautical WARC to include the band 21,924-22,000 kHz in the Table exclusively for the Aeronautical Mobile (R) Service was adopted. Implementation of the 1978 Aeronautical WARC Final Acts was not affected. The exclusive provisions of the Aeronautical Mobile (OR) Service were also maintained without change.

i. Discrete Table entries were retained for the Standard Frequency and Time Signal Service at 2.5 MHz, 5 MHz, 10 MHz, 15 MHz, 20 MHz and 25 MHz. Footnote entries have also been made for the transmission of standard frequency and time signals by stations in Region 3 at 4, 8 and 16 MHz. A new provision for ISM applications was added at 6780 kHz, and the existing provisions at 13,560 kHz and at 27,120 kHz were maintained.

j. A feature of the high frequency part of the Table in comparison with other portions of the Table is the few footnotes giving alternative or additional allocations to individual countries or to groups of countries. In general, those footnotes which have been included for individual countries limit the use of the allocation to services operating within the countries concerned. Other footnotes have been added to allow administrations to use certain bands on a non-interference basis within their territories.

4. Allocations in the Bands 27.5-960 MHz

a. In general, the U.S. proposals in this part of the spectrum were aimed at satisfying the rapidly expanding requirements for shortrange communications in the Aeronautical, Maritime and Land Mobile Services, and the continued satisfaction of broadcasting needs. To accomplish this goal, the U.S. concluded that extensive sharing of frequency bands would be necessary. This approach would have provided administrations with sufficient flexibility to ensure that their future requirements can be adequately accommodated during the time frame of the decisions taken at the 1979 WARC. The Conference increased allocations generally for the Mobile Service worldwide, particularly to satisfy land mobile needs. Sharing of frequency bands was generally accepted where countries were sufficiently separated, with more frequency sharing agreed in Region 3 than in Regions 1 and 2.

b. Between 27.5 and 108 MHz some allocation changes were proposed to enhance provisions for the Radioastronomy Service through a change to the Table or in a footnote. Radioastronomy observations are normally made at a small number of specific locations. Since this service could conduct its research without imposing significant restrictions on the other allocated services, the Conference accepted these changes.

c. A minor change was proposed to the footnote provision for aeronautical marker beacons at 75 MHz. This change required that administrations, in addition to refraining from assigning frequencies that might cause harmful interference to marker beacons, not place any constraint on related aeronautical safety operations. This was agreed. However, the Conference also made a substantial change in the band when it reduced the marker beacon bandwidth from 800 kHz to 400 kHz in Region 2 to align the band worldwide. This will require some improvement in the characteristics of airborne receivers particularly among general aviation aircraft in the U.S. In recognition of this situation, a footnote urges administrations in Regions 2 and 3 to refrain from assigning frequencies to fixed and mobile stations until 1990.

d. The band 108-137 MHz was required for the existing and expanding requirements of aeronautical operations. The U.S. proposed to continue Aeronautical Mobile (R) Service in the band 117.975-136 MHz. It was proposed, however, to modify the footnote provision for use of space communication techniques in the Aeronautical Mobile (R) Service to permit development of satellite systems. There was strong opposition to maintaining this primary footnote on the grounds that VHF aeronautical frequencies are crowded in all parts of the world, that coordination for its use in any Aerosat experiment would place severe constraints on the terrestrial aeronautical operations in the band, and that adequate allocations exist for satellite use at 1600 MHz. The existing footnote was initially deleted at the Working Group level. The U.S. later introduced a footnote for aeronautical mobile satellite use of the band 118-137 MHz on a secondary basis which was adopted by the Conference.

It was also proposed to make a footnote provision for emergency position indicating radiobeacon (EPIRB) systems using satellites on the emergency frequencies 121.5 MHz and 243 MHz. This was agreed with the addition of small guard bands to protect both the satellite EPIRB signals and the operations on adjacent channels.

e. The U.S. proposed to add the Aeronautical Mobile (R) Service in the band 136-137 MHz to meet the future needs of international civil aviation. The proposal would permit Space Research Service operations to continue in the band until January 1, 1990, after which new space research stations would not be authorized. Stations authorized prior to that date could continue to operate but only on a secondary basis to the aeronautical service. Primary Aeronautical Mobile (R), with secondary Fixed and Mobile Services, was agreed for the band 136-137 MHz. Existing space services may continue to operate on a primary basis until January 1, 1990 and on a secondary basis thereafter. The Aeronautical Mobile (R) Service can be introduced only after January 1, 1990 in accordance with internationally agreed plans for that service. Finally, Recommendation ZX was agreed that administrations should take all possible steps to give the required protection to the aeronautical assignments after 1990 and to cease operations of other services as stations of the Aeronautical Mobile (R) Service come into use.

f. There was an important need to provide additional allocations for existing and future shortrange maritime mobile requirements. Therefore, the U.S. proposed a worldwide primary allocation for the Maritime Mobile Service in the band 216-225 MHz. A part of the proposal was to reduce the presently allocated services in the Table to secondary status to permit international maritime planning of the band.

There was sympathy for additional worldwide allocations for the Maritime Mobile Service but agreement to an allocation in this part of the spectrum was not possible because of existing services in Regions 1 and 3. A maritime allocation in the band 216-220 MHz and a mobile allocation at 220-225 MHz was agreed for Region 2. Radiolocation will be reduced to secondary in both bands in Region 2 effective January 1, 1990. The Conference also adopted Recommendation ZY that calls for the next competent WARC to designate suitable bands for a worldwide maritime mobile radiocommunications system. A stronger resolution identifying preferred bands near 900 MHz, e.g., 896-902 MHz and 941-947 MHz, was defeated, principally by African countries which intend to plan the Broadcasting Service (television) in the bands around 900 MHz.

The U.S. also proposed no change to footnote 3595/287 which allows each administration to give priority to the Maritime Mobile Service on only such frequencies as are assigned to stations of that service by the administration. In the U.S. there is considerable use of the footnote 3595/287 frequency bands by certain Land Mobile Services, primarily the railroad industry. There was a strong effort by some maritime countries to modify the footnote to give priority to the Maritime Mobile Service. The language of the footnote was retained essentially without change only after extensive debate on the issue and a very close vote.

g. The band 225-399.9 MHz is heavily used for U.S. Government (primarily military) communications domestically, in Europe and in many other parts of the world, and therefore it was proposed to maintain existing allocations for the Fixed, Mobile and Mobile Satellite Services without change. This objective was met in most of the band; however, the Conference decided to add a primary Table allocation for the Broadcasting Service (television) in Regions 1 and 3 in the band up to 230 MHz. In addition, the fixed and mobile allocations in Region 1 were reduced to secondary status, which is expected to have some impact on U.S. operations in Europe.

The Conference also decided to modify existing footnote 3618/308A which provides for the Mobile Satellite Service in this band. First, the lower segment of the satellite band was changed from 240-328.6 MHz to 235-322 MHz, in order to improve protection to radioastronomy observations in the band 322-328.6 MHz. This band adjustment was acceptable. The footnote was also modified to make the use by the Mobile Satellite Service subject to agreement under the procedures of new Article N13A, which was an appropriate and reasonable requirement, but the Conference then added an additional qualification that such satellite use was "on condition that stations in this service do not cause harmful interference to those of other services operating or planned to be operated in accordance with the Table". The U.S. considered the latter condition to be unacceptable and submitted a reservation for the Final Protocol, jointly with twelve other NATO allies.

h. In the band 420-450 MHz, the U.S. proposed to maintain the exclusive primary Table allocation for the Radiolocation Service for the entire band in Regions 2 and 3 and for the sub-band 430-440 MHz in Region 1. However, the Delegation encountered very strong pressure, mainly from other Region 2 countries and from Region 3, to add primary Table allocations for fixed and mobile and to reduce radiolocation to a secondary basis.

The decisions of the Conference for this band, while far from the desired results, were acceptable in regard to satisfying basic U.S. requirements. The sub-bands 420-430 and 440-450 MHz were modified to provide a worldwide primary Table allocation for the Fixed and Mobile Services and a secondary allocation for the Radiolocation Service. The U.S. and several other countries continued the primary allocation for radiolocation in both sub-bands by adding their names to existing footnote 3640/319. The band 430-440 MHz was continued without change, which includes a worldwide primary allocation for radiolocation.

i. The U.S. proposed that the band 470-890 MHz (with one minor exception) be allocated in Region 2 to the Broadcasting, Mobile and Fixed Services on a primary basis. The intent was to provide sufficient flexibility for administrations to satisfy requirements for these services as they develop in the future. Additional allocations for mobile and fixed had been added to most of the band 890-960 MHz.

The U.S. objective for flexibility in Region 2 in the UHF television band 470-890 MHz was achieved by Table and footnote allocations, as were proposed mobile allocations in portions of the band 890-960 MHz. U.S. footnote allocations had to be taken for portions of the band because of the opposition of many Region 2 administrations to full Table status for the Mobile Service. The U.S. submitted a reservation in the Final Protocol when unnecessary coordination conditions were added to our footnote allocation at the insistence of Canada. Allocations to the Radiolocation Service in the band 890-942 MHz were reduced to secondary status in Region 2 which required us to take a country footnote retaining primary status for radiolocation.

It was proposed to make an exclusive Table allocation for Radioastronomy Service continuum measurements at 608-614 MHz in lieu of footnote 3660/332. The Conference agreed to primary radioastronomy and secondary mobile satellite (except aeronautical mobile satellite) in the Earth-to-space direction. Another U.S. proposal was for a worldwide ISM frequency allocation at 915 MHz plus or minus 13 MHz to provide for industrial heating of medium to large size materials. This was not accepted; however, the existing provisions for Region 2 were maintained.

5. Allocations in the Bands 960 MHz-40 GHz

a. The activities of Working Group 5D in its consideration of the bands 960 MHz-40 GHz involved nearly 4500 specific proposals, significantly more than any other Working Group at the Conference. A number of these were highly contentious, leading to the most difficult negotiations of any WARC issues faced by the U.S. Delegation. Proposals in this part of the spectrum were of several types. First were those intended to accommodate the expanding needs of existing services such as fixed satellite and terrestrial fixed and mobile. Second, there were proposals to provide for new or advanced applications such as GPS radionavigation satellite, active and passive sensing, data relay satellites, and feeder links for broadcasting satellites. Third, there were some proposals for new services and concepts such as the U.S. solar power satellite. Finally, there was a critical need to maintain adequate spectrum for existing services, primarily the Radiolocation Service, in this part of the spectrum. The U.S. proposals were extensive and included each of these four types.

b. The U.S. proposed that the Aeronautical Radionavigation Satellite Service be allocated on a primary co-equal basis with the companion terrestrial service in the band 960-1215 MHz to provide for future unique requirements which may not be satisfied by other systems. The Conference rejected this proposal and maintained the band without change.

c. One of the major objectives of the U.S. at the 1979 WARC was to provide allocations for its newest satellite navigation system, NAVSTAR -- Global Positioning System (GPS). In its present state it consists of six satellites although the ultimate system is to consist of operations involving twenty-four satellites in continuous polar orbit. Originally designed for military applications (ships, aircraft, troops), it may at some point in the future be adapted to civilian use by not supplying some of the sophisticated technology. GPS is far more accurate than any other system in existence.

The U.S. proposed the addition of primary Table allocations for the Radionavigation Satellite Service in the bands 1215-1240 MHz and 1563-1590 MHz. This objective was fully achieved. In the band 1215-1240 MHz the Amateur Service was deleted to protect the GPS system. During the discussions in the Conference the Soviet Union stated a requirement for a similar type of radionavigation satellite system in the band 1240-1260 MHz. The Conference approved an allocation for radionavigation satellite in this band without seriously impacting on other U.S. objectives. New footnote 3673A specifies that the use of the Radionavigation Satellite Service is subject to the condition that no harmful interference is caused to the Radionavigation Service authorized in thirty-six countries of Regions 1 and 3 under footnote 3673.

d. A new footnote for spaceborne radars was proposed in the band 1240-1300 MHz and four other bands higher in the spectrum with the allocation provision limited to secondary status which would provide protection to the terrestrial radiolocation systems. The Conference provided this secondary allocation in footnote 3675A for the use of radiolocation stations on spacecraft in the bands 1215-1300 MHz, 3100-3300 MHz, 5250-5350 MHz, 8550-8650 MHz, 9500-9800 MHz and 13.4-14.0 GHz.

The U.S. proposed to add the Amateur Satellite Service in the band 1250-1260 MHz and in five other bands up through the spectrum by modification of existing footnote 3644/320A. In each case the amateur satellite was secondary and added to an existing or proposed radiolocation band. The Conference accepted this proposal although the band was shifted to 1260-1270 MHz to accommodate the Soviet radionavigation satellite system. The other three bands are 2400-2450 MHz, 3400-3410 MHz and 5650-5670 MHz.

Although not contained in the U.S. proposals, the Conference adopted a new footnote that allocated the bands 1240-1300 MHz and 1350-1370 MHz to the Aeronautical Radionavigation Service on a primary basis in Canada and the United States.

e. As a general principle, the U.S. proposed to add a primary Table allocation to the Earth Exploration Satellite (passive) and Space Research (passive) Services in the band 1400-1427 MHz and all other higher bands allocated exclusively to the Radioastronomy Service. The U.S. also proposed to add a footnote provision for these services in certain adjacent bands already identified for radioastronomy use. The Conference approved the addition of these two services in all exclusive radioastronomy bands and took specific action to improve the status of the passive bands through the addition of footnote 3679BB which prohibits all emissions. New footnote 3680D provides a secondary allocation to the Space Research (passive) and Earth Exploration Satellite (passive) Services in the bands 1370-1400 MHz, 2640-2655 MHz, 4950-4990 MHz, and 15.20-15.35 GHz.

f. The U.S. proposed to recognize the ongoing search for extraterrestrial intelligence (SETI) by the addition of a footnote in all bands between 1400 and 1727 MHz and in several higher bands. SETI observations are currently being carried out in a number of locations. The Conference adopted footnote 3679A which recognizes the passive research being conducted in the search for intentional emissions of extraterrestrial origins in the bands 1400-1727 MHz, 101-120 GHz and 197-220 GHz. The Conference also adopted Recommendation YU which calls this matter to the attention of a future competent Administrative Radio Conference to consider making further provisions for this application.

g. Specialized mobile operations involving flight telemetry and air frame testing in the United States are conducted in the band 1435-1535 MHz and were proposed in the band 2310-2390 MHz. In view of the critical nature and safety-of-life aspects of the operation, the U.S. proposed to add a new footnote that recognized this application as the primary mobile use in Region 2 in the two bands. The Conference adopted footnote 3680C for Region 2 that establishes a priority for telemetry applications over other uses by the Mobile Services in the former band. New footnote 3680A creates the same priority in the latter band but only in the United States and two other countries. One negative aspect of the allocation decisions in this part of the spectrum is the eventual reduction by 5 MHz of the lower frequency band used for aeronautical mobile telemetry operations to accommodate maritime satellite operations after 1990. However, it is felt that this decision will not place an unduly severe constraint on current and future operations.

h. The band 1535-1660 MHz provided for aeronautical and maritime mobile satellite and aeronautical radionavigation in the Table and for aeronautical mobile (R) and radioastronomy in footnotes. Since the time of allocation of the band at the 1971 Space WARC there were significant changes in the requirements foreseen in the band. These included a substantial increase in bandwidth for maritime satellites, frequency support for the NAVSTAR GPS radionavigation satellite, and a decrease in the number and types of systems planned for operation in the radionavigation band.

The U.S. proposals took into account several objectives. First, it was considered necessary to maintain the existing band edges of 1535-1660 MHz to avoid impact on services in adjacent bands. Second, it was desired to adopt allocations such that there was a common frequency separation between the up and down satellite links for the aeronautical, maritime and distress portions of the band. Third, it was necessary to maintain the existing bandwidth available for the Aeronautical Satellite Service while increasing the maritime satellite allocation. Finally, there was a need to accommodate the GPS system in a fully compatible manner. The Conference decisions to provide for these requirements were fully acceptable although not all of the specific U.S. objectives were achieved. Maritime Mobile Satellite Service was increased to 14 MHz in the downlink direction and 19 MHz in the uplink, which recognized the greater traffic requirement in the ship-shore direction. The lower 5 MHz of the maritime satellite band will become available in 1990. Mobile Satellite Service was maintained at 1 MHz bandwidth in each direction with a new footnote that limits the use of this band to distress and safety pruposes. The Aeronautical Mobile Satellite Service was provided 14 MHz in each direction which required the overall band to be shifted upwards slightly into the existing Radioastronomy Service band. However, this is expected to have a minimal impact on the latter service. Aeronautical Radionavigation and Radionavigation Satellite Services were fully provided for in the center of the band. The resulting overall band edges are 1530 MHz and 1660.5 MHz.

i. The U.S. proposed a number of changes in the band 1700-2300 MHz. The first was a primary worldwide allocation for the Meteorological Satellite Service in the band 1700-1710 MHz with a reduction of the Fixed and Mobile Services to a secondary status. The Conference accepted the primary Table allocation for the meteorological satellite although it did not reduce the Fixed and Mobile Services to secondary status.

Allocations for the Space Operations Service were proposed on a worldwide primary basis in the Table in the bands 1721-1850 MHz and 2200-2290 MHz to provide common standardized equipment in support of all types of satellite systems. To accommodate this requirement, the Conference adopted footnote 3703/356A for Space Operation and Space Research Services in Region 2 and a few other countries in the band 1750-1850 MHz.

Space Research, Space Operations and Earth Exploration Satellite Services were proposed for various parts of the bands 2025-2120 MHz and 2200-2290 MHz to satisfy the requirements for data transfer. The allocations in this part of the spectrum would also be used by the data relay satellite system now under development by NASA that will be used to collect information from a number of low orbiting satellites. The Conference agreed to these proposals on a slightly reduced basis. New footnotes provide for these three services on a worldwide primary basis in the bands 2025-2110 MHz and 2200-2290 MHz; however, space-to-space applications are required to protect other space service operations.

The U.S. proposed to designate two of the existing space research bands for deep space only, since deep space and near space operations cannot share the same band. The Conference adopted footnote 3707B which provides for space research (deep space) on a primary worldwide basis in the band 2110-2120 MHz for Earth-to-space transmissions. The band 2290-2300 MHz was modified to include a worldwide primary Table allocation for space research (deep space) in the downlink direction. The U.S. proposal to limit the primary mobile allocation to other than aeronautical mobile, in order to protect the very sensitive deep space systems from airborne transmissions, was accepted.

j. One of the new concepts considered for this part of the spectrum involved the U.S. proposal for solar power satellite (SPS) systems which may offer the potential for an alternative energy source within the time frame of the decisions of the 1979 WARC. The U.S. proposed that the frequency 2450 MHz be designated for the wireless transmission of energy on the condition that SPS shall not cause harmful interference to stations in other bands. The U.S. proposal was opposed by many countries in both the developed and developing regions of the world. As an alternative, the Conference adopted Recommendation XO calling for CCIR study of the matter but also pointing to the SPM Report which notes 2450 MHz as an appropriate frequency for this use. The Recommendation also invites CCIR to transmit its study to the United Nations.

k. In the view of the U.S. the band 2500-2690 MHz offered unique opportunities for innovative satellite systems in Region 2. The Broadcasting Satellite Service was already allocated in the entire band while Fixed Satellite Service was only allocated in the lower and upper 35 MHz. Because broadcasting satellite is limited to one-way transmission, the U.S. proposed to add fixed satellite (downlink) in the band 2535-2655 MHz to allow flexibility in developing small-terminal interactive systems, possibly operating both fixed satellite and broadcast satellite in a common system. The Conference accepted this proposal and the Fixed Satellite Service (downlink) is now allocated in the Table for Region 2 in the entire band 2500-2690 MHz. Fixed satellite (uplink) is also allocated in the band 2655-2690 MHz.

It was also proposed to relax the power flux density limits for broadcasting satellite by 10 dB and to change the fixed satellite power limit to the same values as broadcast satellite in the band 2500-2655 MHz. This change would allow the use of earth stations using small antennas of about 1 meter diameter. The Conference did not agree to the 10 dB relaxation in the broadcast satellite power limit although it did line up the fixed satellite and broadcast satellite power limits to be the same values. It is interesting to note that Region 3 countries adopted a footnote which added the Mobile Satellite Service to the lower and upper 35 MHz bands in order to achieve even greater flexibility in the development of future systems.

l. The bands 2700-3400 MHz and 9300-9800 MHz are allocated principally to the Radionavigation and/or Radiolocation Services. In general, the U.S. proposed a status quo in these bands with only slight adjustments to accommodate certain radionavigation requirements.

The U.S. proposed provisions for maritime transponders at 3090 MHz and in the band 9500-9520 MHz, and for ground based aeronautical radar beacons in the band 9300-9320 MHz. The latter proposal was accepted by the Conference but the two maritime provisions were rejected. The Conference adopted a footnote specifying that shipborne transponders must be confined to the bands 2930-2950 MHz, 5470-5480 MHz and 9280-9300 MHz. The Conference also adopted Resolution CO relating to the use of these bands and actions which might be taken by a future conference, Recommendation YZ relating to the overall use of these bands for radionavigation purposes, and Recommendation XA relating to the technical standards of shipborne transponders. It is also interesting to note that footnote 3727A provides for maritime shore based radars in the band 2850-2900 MHz in Canada.

m. Fixed Satellite Service below 10 GHz:

1) There was worldwide agreement on the need for additional allocations to the Fixed Satellite Service below 10 GHz. The U.S. and most other countries at the Conference sought additional frequency bands for this service to meet INTELSAT requirements although some other countries also wanted to accommodate domestic and regional systems. Frequencies of this order were strongly preferred over higher parts of the spectrum for both economic and technical reasons. At the same time these frequency bands were already heavily used by existing systems. This requirement gave rise to sharp controversy throughout the entire period of the Conference and consequential negotiations were intense and sustained.

2) The U.S. had identified a sizeable requirement on the order of 700 MHz in the up direction and 400 MHz in the down direction for additional fixed satellite allocations below 10 GHz to satisfy projected needs. This included a requirement for feeder links to broadcasting, maritime and possibly other satellite networks including the uplinks to fixed and broadcast satellites operating in the band 2500-2690 MHz. The U.S. proposed to meet these needs in the band 1850-2200 MHz and part of the existing band

3400-3700 MHz for downlink requirements and in the band 6425-7115 MHz for the uplink. In the United States the new bands would generally be limited to international systems with the exception of satellites operating in the 2500 MHz band.

3) The Conference quickly recognized that it was relatively easy to satisfy the uplink requirement in the 6 GHz band. The real problem was to identify suitable bands for the space-to-Earth direction. The Conference rejected the U.S. proposal at 2 GHz immediately and identified the bands 3400-3700 MHz and 4500-4800 MHz for this purpose. The former band was an existing fixed satellite allocation that had never been implemented except for the MOLNIYA satellite system of the Soviet Union. A special concern of the U.S. was to preserve the primary status and full operational usability of the Radiolocation Service in the band 3400-3600 MHz, now used by important military radar systems. Part of the band 4500-4800 MHz had been allocated to the Fixed Satellite Service but for use in the opposite direction. This band was heavily used by existing fixed (including extensive troposcatter links) and mobile systems, both in the United States and throughout Europe in support of defense requirements. In summary, both bands were unacceptable to the U.S. if any constraints or decrease in the availability of these bands to the heavily implemented existing systems were involved.

The U.S. Delegation took a very strong position on this issue, indicating that it would not accept any decision to downgrade the status of radar systems in the band 3400-3600 MHz. In addition, any discussion of the band 4500-4800 MHz would be linked to successful resolution of the 3 GHz question. During the difficult negotiations that followed, the U.S. implied that it would a) refuse to implement the new fixed satellite frequencies in the U.S.; b) not provide protection to the Fixed Satellite Service from the radars; c) consider using our influence in INTELSAT to block implementation of the frequencies. All of these possibilities were mentioned in an effort to find an acceptable compromise that would at least partially satisfy the needs of the Fixed Satellite Service below 10 GHz.

Led primarily by India, the Conference rejected the U.S. views and Committee 5 adopted changes to the Allocation Table that were unacceptable to the U.S. The Delegation then gave consideration to the development of specific U.S. footnotes that would implement one or more of the possible courses of action which had been pointed out to the other delegations. It was finally decided that the U.S. Delegation should place before the Conference a specific footnote that excluded the Fixed Satellite Service in the United States in both bands. When this was done, the seriousness of our action was recognized by many developing countries and a small group of third world interests, led mainly by Jamaica and Brazil in consultation with INTELSAT representatives, worked continuously to achieve a compromise that would overcome our strong objection. At the eleventh hour of the Conference this group was successful in developing an acceptable compromise and the earlier adverse decision of Committee 5 was overturned at the Plenary level.

4) The resulting decisions of the 1979 WARC regarding Fixed Satellite Service allocations below 10 GHz, although not without many difficulties, were acceptable to the U.S. In the band 3400-3700 MHz the existing allocation for Fixed Satellite Service (downlink) was retained on a worldwide basis. The radiolocation allocation in the Table was reduced to secondary status in all Regions. Footnote 3736A maintains the primary allocation for the Radiolocation Service in Regions 2 and 3, and urges all administrations operating radiolocation systems to cease operations by 1985. The removal of a mandatory requirement to cease radiolocation operations was a key element in the development of an acceptable compromise.

The Conference suppressed the existing allocation for Fixed Satellite Service (uplink) in the band 4400-4700 MHz. A new allocation for fixed satellite (downlink) was added to the band 4500-4800 MHz. New footnote 3748B indicates that the Fixed Satellite Service will not be available in the United Kingdom, Belgium, Norway and the Netherlands. To meet uplink requirements the Conference added fixed satellite to the band 5850-5925 MHz in Region 2 thereby establishing a worldwide allocation in that band. The Conference also added the Fixed Satellite Service (uplink) to the band 6425-7075 MHz providing an overall increase for fixed satellite (uplink) of 725 MHz.

An important part of the eventual compromise was a "declaration" signed by the United States and a number of other developed countries. The declaration is as follows: "The Administrations of the USA, Canada, UK, Netherlands, Australia, Belgium which are member countries of INTELSAT recognizing the importance of the bands 3.4-3.6 GHz and 4.5-4.8 GHz for use by the Fixed Satellite Service (FSS), agree as follows:

> i) they shall not by reason of footnotes 3736, 3736A, and 3748B withhold support for the implementation of the FSS in these bands by INTELSAT

either as to the space segment or
as to the use of the band
4.5-4.8 GHz in any other country other than
those listed in footnote 3748B.

ii) they shall make reasonable effort
to accommodate FSS consistent with footnotes
3736, 3736A and 3748B and the normal procedures
of the INTELSAT organization.

The above-mentioned administrations will advise their Signatories to the INTELSAT Agreement accordingly."

The specific conditions for the use of the Fixed Satellite Service by INTELSAT in the United States and in other areas of interest to the U.S. are complex and will require detailed study.

n. Earth Exploration Satellite (passive) and Space Research (passive) Services were proposed to be added to the aeronautical radionavigation band at 4200-4400 MHz which is reserved exclusively for airborne radio altimeters. A proposed footnote provided that no protection will be required from the altimeters. The Conference adopted footnote 3743A to satisfy this requirement.

o. The U.S. proposed that the existing exclusive allocation for radioastronomy in Region 2 in the band 4990-5000 MHz be maintained and that the Space Research (passive) Service be added to the band. This proposal was not accepted by the Conference. Instead, the Conference decided to add the Fixed and Mobile Services to the band in Region 2 thereby establishing a worldwide allocation for fixed and mobile shared with the Radioastronomy Service. Space research (passive) was added to the Allocation Table on a secondary basis.

p. An international standard system for precision approach and landing (MLS-microwave landing system) had been adopted by ICAO in the band 5000-5250 MHz. Therefore, the U.S. proposed that the MLS be given priority in the band by addition of a new footnote. The Conference supported this proposal and adopted a new footnote 3750AA giving priority to MLS. The U.S also proposed to delete several footnotes and transfer their provisions into the Table for the Aeronautical Mobile (R) and Radionavigation Satellite Services. It was intended that the band would be planned by ICAO. However, the Conference rejected this proposal.

q. The bands 5250-5850 MHz were allocated principally to the Radionavigation and/or Radiolocation Services. The U.S. proposed a status quo for these bands. The Conference agreed with this view and made virtually no changes.

r. Various proposals were submitted by the U.S. for passive sensing, space research, and space operations in the vicinity of 7 GHz. The U.S. proposed a footnote that would recognize passive sensing over ocean areas in the band 6425-7125 MHz. Space research (deep space) was proposed for the bands 7145-7235 MHz (uplink) and 8400-8500 MHz (downlink). Space operations in the band 7125-7155 MHz and space research in the band 7125-7145 MHz were proposed. All of these proposals were satisfactorily accommodated by the decisions of the Conference. The U.S. also proposed to add Space Research Service (downlink) in the band 7750-7850 MHz. However, this was not adopted by the Conference.

s. The U.S. proposed to add a primary Table allocation for the Mobile Satellite Service in the bands 7250-7750 MHz and 7900-8400 MHz. The requirement was for government satellite systems in which both fixed and mobile earth stations communicate in the same system. The mobile aspects of the system were not clearly provided for because of decisions taken at the 1971 Space WARC regarding definition amendments that changed the allocation from Communication Satellite Service to Fixed Satellite Service. The U.S. objectives were to gain recognition of the Mobile Satellite Service, retain two exclusive space service sub-bands for the Fixed Satellite and Mobile Satellite Services, and to expand the exclusive bands for these space services.

On balance, the essential U.S. objectives were reasonably satisfied by the Conference. The Mobile Satellite Service was added to the Table by means of a footnote in the bands 7250-7375 MHz and 7900-8025 MHz. However, the exclusive space bands were not maintained since there was strong pressure to add fixed and mobile on a primary basis in this part of the spectrum.

t. The bands 8500 MHz-10.5 GHz were allocated principally to the Radionavigation and/or Radiolocation Services. As in the lower bands, the U.S. proposal was to maintain the status quo for these services. A few minor changes were adopted involving the Aeronautical and Maritime Radionavigation Services. Of more significance was the pressure to add fixed and mobile primary allocations in this part of the spectrum. Many countries joined in a new footnote in the band 8500-8750 MHz which gives primary status for Fixed and Mobile Service. The band 10.0-10.45 GHz in which the Radiolocation Service had a worldwide exclusive primary status was modified to add Fixed and Mobile Services on a primary basis in Regions 1 and 3. The band 10.5-10.55 GHz was modified in the same way for Regions 2 and 3.

u. The maritime community had identified a requirement for future systems involving safety of ship movement such as collision avoidance and ship-to-ship interrogation. The U.S.

proposed to add a primary Table allocation in the band 10.55-10.60 GHz to satisfy these needs on a co-equal basis with the Fixed Service. Priority was given in the lower 20 MHz of the proposed band to meet safety operations in the vicinity of ports and waterways. It was intended that this latter provision would allow international maritime planning of the band. The Conference rejected the proposal although it did adopt Resolution CM calling for further CCIR and national study and inviting the next competent WARC to review possible frequency provisions in the light of additional studies.

v. The U.S. proposed to satisfy critical requirements of the Earth Exploration Satellite (passive) and Space Research (passive) Services in the bands 10.6-10.7 GHz and 18.6-18.8 GHz. Power limits for terrestrial stations in the Fixed and Mobile Services and power flux density limits for the Fixed Satellite Service were proposed in new footnotes to protect the passive services. The Conference accepted the proposal for the former band. However, the new footnote permits a slightly higher power limit for the Fixed and Mobile Services than desired by the U.S. In the latter band, the Conference adopted a primary allocation for Region 2 and secondary allocations for Regions 1 and 3. It also adopted Recommendation YW calling for further CCIR study of the appropriate power limits for this band.

w. To meet firm requirements for the future expansion of INTELSAT, a substantial increase in fixed satellite allocations was required above 10 GHz. The U.S. proposed to allocate an additional 500 MHz in each direction for the Fixed Satellite Service in the bands 10.7-10.95 and 11.2-11.45 GHz (downlink) and 12.75-13.25 GHz (uplink). The Conference adopted this proposal, resulting in a total allocation of 1 GHz for the Fixed Satellite Service in each direction in the bands 10.7-11.7 GHz (downlink) and 12.75-13.25 and 14.0-14.5 GHz (uplink).

x. All administrations sought at the Conference to identify suitable bands to serve as feeder links for the Broadcasting Satellite Service. In general, the U.S. position was that feeder links for the various radio services including broadcasting satellite, should be satisfied in the most appropriate fixed satellite band. As an exception, the U.S. proposal to separate fixed satellite and broadcasting satellite allocations at 12 GHz in Region 2 created a need for an additional 500 MHz allocation for fixed satellite for use limited to broadcasting satellite feeder links. Therefore, it was proposed that fixed satellite (uplink) be added to the band 17.1-17.6 GHz primarily for use in conjunction with the Broadcasting Satellite Service in the 12 GHz band.

As with other fixed satellite issues, this subject was extremely controversial. Developing countries led by India made a strong effort to place the feeder links in the band 14.5-15.35 GHz to be shared on a primary basis with the terrestrial Fixed and Mobile Services. The U.S. took an equally strong objection to the proposed sharing in this band, particularly in the upper portion, because of worldwide use of the present allocations for defense and other purposes. The U.S. was joined in its opposition by a number of allies and also by the USSR which has other uses for this band that are technically incompatible with feeder links. After a prolonged and frequently bitter controversy, a compromise was adopted which provided for the use of several bands for broadcasting satellite feeder links at the option of individual administrations. In each case, the band is allocated to the Fixed Satellite Service (uplink) and is limited to feeder links for the Broadcasting Satellite Service. The band 10.7-11.7 GHz is available for this purpose in Region 1. The bands 14.0-14.5 GHz and 14.5-14.8 GHz are available for countries outside Europe, with the former band subject to coordination with other networks in the Fixed Satellite Service. The third band, 17.3-18.1 GHz, is available on a worldwide basis for this purpose.

The use of the new bands for broadcasting satellite feeder links will be in accordance with agreements and associated plans to be adopted at a future radio conference. Resolution BQ invites the Administrative Council to study the question of convening such a conference for Regions 1 and 3. In the interim, administrations of Regions 1 and 3 are to apply the procedures prescribed in Articles N11/9A and N13/9A and in new Resolution CS for any use of the feeder links to broadcasting satellites. New Resolution CH, relating to the Region 2 Broadcasting Satellite Conference scheduled for 1983, calls for the Region to plan feeder links in an appropriate part of the band 17.3-18.1 GHz.

y. An important issue for the United States and other Region 2 countries involved the band 11.7-12.7 GHz. The 1971 Space WARC had allocated the band 11.7-12.2 GHz in Region 2 to both the Broadcasting Satellite and Fixed Satellite Services to meet anticipated requirements. At the 1977 Broadcasting Satellite WARC, Region 2 decided to defer planning and adopted an interim arc segmentation scheme that designated separate parts of the geostationary orbit to broadcasting and fixed satellites until such time that a regional planning conference was held. After considerable study of the problem, the U.S. concluded that the arc segmentation scheme would not meet Region 2 requirements of either the Broadcasting Satellite or Fixed Satellite Services in this part of the spectrum. It was further concluded that the ideal solution would be to provide separate allocations for each service. Therefore, it was proposed to move the allocation for

Broadcasting Satellite Service upward to the band 12.2-12.7 GHz and to maintain the Fixed Satellite Service allocation in the existing band 11.7-12.2 GHz. The decision to move broadcasting satellite was based on the extensive development of fixed satellite systems in the lower band. Additionally, the Broadcasting Satellite Service would be easier to share with existing and future terrestrial services in the band 12.2-12.7 GHz than the planned fixed satellite systems.

During the Conference many Region 2 countries expressed a strong wish to defer the allocation question until the 1983 regional conference. They generally agreed to expand the allocation for the two satellite services to a total of 1 GHz in recognition of the need for additional spectrum, but desired to postpone the final decision on the amount of the allocation to each service until they had a better idea of their requirements for the space services. The U.S. persisted in the negotiations in view of the advanced planning for domestic fixed satellite systems in the band 11.7-12.2 GHz. The resulting Conference decisions met nearly all the specific U.S. objectives and were fully acceptable.

The Conference adopted allocations in Region 2 for the Fixed Satellite Service in the band 11.7-12.3 GHz and for the Broadcasting Satellite Service in the band 12.1-12.7 GHz, along with compatible terrestrial services. The center band, 12.1-12.3 GHz, was allocated on a co-equal, primary basis to both services until a final decision is taken by the 1983 regional conference. Both satellite services are limited in Region 2 to national and sub-regional systems. In the lower band, transponders on fixed satellites may also be used for broadcasting satellite transmissions provided the maximum radiated power does not exceed 53 dBW per television channel. The upper band may also be used for the Fixed Satellite Service provided that such transmissions do not cause more interference or require more protection from interference than the Broadcasting Satellite Service operating in accordance with a plan. The Conference also adopted Resolution CH calling for a regional radio conference not later than 1983 to carry out detailed planning of the Broadcasting Satellite Service in the upper band. Resolutions CI, CJ and CK also relate to the upcoming 1983 Broadcasting Satellite Conference for Region 2.

Another item of interest in this band was an Australian proposal to add Broadcasting Satellite and Fixed Satellite Services in Region 3 to provide for possible future implementation of hybrid satellite systems. After much discussion, it was agreed to add allocations in the Table for the Fixed Satellite and Broadcasting Satellite Services in the band 12.5-12.75 GHz for Region 3. Resolution CL refers to the establishment of new services under this allocation.

z. In the band 13.4-14.0 GHz, the U.S. proposed that the primary allocation for the Radiolocation Service be maintained, that a new allocation be added for Standard Frequency and Time Signal Satellite Service (uplink) and that a secondary Table allocation be added for the Space Research Service. The Conference agreed to these proposals; however, a large number of countries are now included in a new footnote that also allocates this band to the Fixed and Mobile Services on a primary basis. In view of the addition of this footnote, the U.S. included the band 13.4-14 GHz among others between 430 MHz and 36 GHz in its reservation stating that it could not provide protection to these services from the radiolocation operations.

aa. The U.S. proposed to maintain the Radiolocation Service as a primary Table allocation in the band 15.7-17.7 GHz. It was also proposed to add a primary Table allocation for the Space Research Service (uplink) to meet deep space requirements in the bands 16.6-17.1 GHz. The Conference agreed to continue radiolocation as a primary Table allocation in most of the band; however, above 17.3 GHz, the allocation was downgraded to secondary status. Space research (deep space) was added to the Table in the proposed band but only on a secondary basis. Earth exploration satellite (active) and space research (active) were added as secondary Table allocations in the band 17.2-17.3 GHz to meet requirements that the U.S. had proposed to be satisfied in other bands.

bb. The existing Table provided allocations to the Fixed Satellite Service in the bands 17.7-21.2 GHz (downlink) and 27.5-31.0 GHz (uplink) in which the upper 1 GHz of each band is designated for U.S. Government space systems nationally. The Conference agreed to the U.S. proposal that these bands should be maintained. In addition, the U.S. had proposed to add the Mobile Satellite Service on a primary basis to the bands 20.2-21.2 and 30.0-31.0 GHz since requirements exist for the development of Government satellite systems that include both fixed and mobile earth stations on land, air and sea platforms similar to existing systems at 7/8 GHz. The Conference accepted this proposal although many countries are now included in new footnotes that give primary allocation status to the Fixed and Mobile Services. The Conference also adopted secondary Table allocations for mobile satellite in the bands 19.7-20.2 and 29.5-30.0 GHz.

The U.S. also proposed a primary Table allocation for the Meteorological Satellite Service (downlink) in the band 17.7-17.9 GHz. This requirement was satisfied by the addition of footnote 3799A which provides for meteorological satellite on a primary basis in the band 18.1-18.3 GHz.

cc. The existing Allocation Table provided an allocation to the Broadcasting Satellite Service in the band 22.5-23 GHz for Region 3 only. The U.S. proposed that this allocation be extended worldwide on a primary Table allocation basis. The Conference adopted this proposal for Regions 2 and 3 only.

dd. Existing allocations to the Intersatellite Service in the vicinity of 60 GHz cannot be used in the near future for technical and economic reasons. Therefore, it was considered necessary to provide allocations lower in the spectrum to satisfy near-term requirements for direct links between satellites. The U.S. proposed to add the Intersatellite Service allocation in the bands 22.6-23.6 GHz and 25.25-26.25 GHz on a shared, co-equal basis with existing services. The Conference accepted the former proposal adjusted slightly downward to the band 22.55-23.55 GHz, but was unable to accommodate the Intersatellite Service in the upper band. Instead, an allocation for the Intersatellite Service was approved in the band 32-33 GHz. Recommendation WV was adopted which calls attention to the sharing problems between the Intersatellite Service and the Radionavigation Service in this band.

ee. To provide for the transfer of data between satellites, the U.S. had proposed the addition of a primary Table allocation for the earth exploration satellite (space-to-space) in the band 25.25-27.5 GHz. The Conference adopted a secondary Table allocation to satisfy this requirement.

6. Allocations in the Bands Above 40 GHz

a. The U.S. proposed that specific allocations be made for both space and terrestrial services in the bands from 40 GHz to 300 GHz. Specific allocations were necessary for several reasons. First, many spectral lines had been identified which are important to the passive radio services -- radioastronomy, space research and earth exploration satellite. The unique physical properties of the lines dictate the allocations for these services. Second, development of equipment for frequencies above 40 GHz was currently in progress. Specific allocations would provide guidance for the orderly development of new technology and the next generation of telecommunications systems. Finally, it was not certain when the next radio conference, competent to deal with the spectrum above 40 GHz, would be convened. In view of the rapid development of the recent past, it was felt necessary to prepare for the future by providing sufficient allocated bands in a flexible arrangement to accommodate the foreseen requirements.

b. The Conference adopted several principles to guide the decisions taken in this part of the spectrum. First, it fully recognized that due account had to be taken of the effects on allocations of the absorption bands related to the atmospheric constituents -- oxygen and water vapor. While these would result in restrictions on the use of spectrum for certain types of service in the bands concerned, they could also be exploited to advantage in other cases. Second, a middle-of-the-road approach was taken between the two extremes for allocating the bands: an exclusive or very limited sharing basis versus allocation of a band to many services that could be shown to be compatible in principle. Finally, it was recognized that the time frames within which the various services would exploit the spectrum above 40 GHz would vary over a wide range. There is already significant activity in areas such as radioastronomy, while it might be some time before operational broadcasting and radionavigation systems evolved. There was broad agreement that specific allocations were required to act as stimulus and guidance for research and development.

c. In general, all U.S. objectives were met in the bands above 40 GHz, although the Conference decided to adopt specific allocations only up to 275 GHz rather than the 300 GHz limit we proposed. The Allocation Table was actually extended to 400 GHz, with a Table entry in the band 275-400 GHz stating "not allocated" and a footnote authorizing experimental and developmental use for the various active and passive services. The footnote also lists several bands of interest to the Radioastronomy, Space Research (passive) and Earth Exploration Satellite (passive) Services, with texts urging administrations to protect these passive services until the next competent WARC takes further decisions. It is interesting to note that there is not a single exclusive allocation above 40 GHz.

d. In general, the U.S. proposed to add the companion terrestrial service to the already existing space service allocations in most bands noting that allocations above 40 GHz were confined previously to the space services and to radioastronomy. The group of allocations to the Aeronautical and Maritime Mobile/Radionavigation Satellite Services were generalized in this manner by the addition of corresponding terrestrial services.

It was also proposed to allocate a number of bands to the Fixed and Mobile Satellite Services. A new allocation was proposed for the Intersatellite Service and terrestrial Fixed and Mobile Services were added to all Intersatellite Service bands in the high absorption areas of the spectrum. The pattern of allocations to the Intersatellite and the Fixed

Satellite Services follows generally that laid down by the 1971 WARC, i.e., with the former concentrated in the absorption bands to provide shielding between the space and the surface (or low altitude) systems, and the latter located in spectrum between the absorption bands. Allocations were made to a variety of terrestrial services, although in the case of certain combinations of space and terrestrial services, it was concluded that there was inadequate information on sharing. Footnotes were therefore added to reflect this uncertainty and the subjects were referred to the CCIR for further study.

The need for spectrum for feeder links to broadcasting satellites was taken into account in allocations to the Fixed Satellite Service. In the 40 GHz region a band was identified by a footnote although not reserved exclusively and the potential need for the broadcasting satellite application has been emphasized. In the same way, additional spectrum was allocated to the Fixed Satellite Service (Earth-to-space) near 100 GHz keeping in mind the allocation to Broadcasting Satellite Service in the band 84-86 GHz.

e. Radioastronomy and the other passive services have unique requirements in this part of the spectrum. Exclusive allocations in the Table were proposed for radioastronomy in each of the atmospheric "windows" and at several other frequencies for continuum emission observations. In general, all three passive services were proposed for these bands. Allocations of additional spectrum were made to the Radioastronomy Service, recognizing in each case the nature of the observations, i.e., of spectral lines or of the continuum. Significant increases have been made to the spectrum allocated to the Earth Exploration Satellite and the Space Research Services for the operation of passive sensors. In addition, provision was made for the operation of radars on board spacecraft in the latter two services.

f. Primary allocations were proposed for the Radiolocation Service in each of the "windows" in order to offset to some extent the very high attenuation suffered in the two-way signal path required by radar. Radiolocation allocations were made in two distinct groups -- in the absorption bands for shortrange systems with a high potential for frequency re-use, and in the radio windows between those bands for longrange systems.

g. Small exclusive allocations were proposed for the Amateur and Amateur Satellite Services to permit a wide range of experimentation without restrictions or interference from other radio services. The Amateur Service was also proposed on a secondary basis in several bands allocated to the Radiolocation Service. Extensive allocations were adopted for the Amateur and Amateur Satellite Services, both on an exclusive basis and on a shared basis with other services and with a secondary status. In the latter case, the allocations are contiguous with the former.

h. Three new bands were designated for ISM applications. Two significant factors in the allocations are that the bands are in harmonic relationship and that the use of the bands is subject to special authorization by the administration concerned in agreement with other administrations whose radiocommunications services might be affected.

7. Other Provisions Relating to Frequency Allocations

a. In addition to the Table of Frequency Allocations, Committee 5 was responsible for consideration of all other provisions in the Regulations relating to the use of frequency allocations. This included definitions (other than technical terms), general and specific rules for the assignment and use of frequencies, and certain provisions relating to a single service which had been included in the agenda for the Conference. Discussion of these items is contained in the following paragraphs.

b. It was the U.S. position that the terms and definitions of Article N1/1 were generally adequate. Due to the profound effect that terms and definitions have on the interpretation of the Radio Regulations, it was considered important that changes to this Article be kept to an absolute minimum. The U.S. proposed that a few terms and definitions be slightly modified. In addition, new definitions were proposed to be added for maritime radar beacon (RACON), transponder and maritime transponder. The purpose of these new definitions was to distinguish clearly between these types of operational uses.

The Conference spent a considerable amount of time and discussion on the subject of definitions. The overall structure of the Article was amended by both Committee 8 in relation to the rearrangement of the Radio Regulations and by the several committees including Committee 5 which reviewed various sections of the Article. In the end there were substantial additions to and modifications of the existing terms and definitions. Under the category of general terms, new definitions were added for administration (identical to that now included in the Convention), coordinated universal time (UTC), and industrial, scientific and medical (ISM) applications. A new section was added to the Article providing definitions for allocation, allotment, and assignment. In the section entitled Radio Services, new terms were added for radiocommunication service, mobile earth station, coast earth station, aeronautical earth station, aircraft earth station, feeder link. The existing separate services of standard frequency and time signals were combined into a single service. New operational terms were established for public correspondence and telecommand. Finally, new terms were established to define active sensor and passive sensor. In addition to the creation of these new terms, Committee 5 modified about thirty of the existing definitions.

Although not consistent with the initial U.S. views for the handling of terms and definitions, the Delegation found the many additions and modifications to be acceptable. The U.S.-proposed modifications were nearly all adopted. However, the three new definitions proposed were not accepted by the Conference.

c. The next major category of work in this area involved the general and special rules for the assignment and use of frequencies as contained in Articles N5/3, N6/4, the initial sections of Article N7/5, and Article N8/6. The U.S. proposed very few changes for these Regulations since the existing provisions were generally adequate and necessary.

In Article N5/3, General Rules for the Assignment and Use of Frequencies, the Conference added a number of provisions. First was a general regulation encouraging Members to limit the number of frequencies and spectrum space used to the minimum essential to provide satisfactory service. This new provision is a duplication of the existing provision No. 130 of the Convention. A provision was added for the new passive services of space research and earth exploration satellite which provides that they shall be afforded protection from other services only to the extent that these different services are protected from each other. This new provision parallels the existing one for radioastronomy. Finally, two new provisions were added to Article N5/3 to provide on an exceptional basis for a station in distress or involved in disaster situations to use any means of radiocommunication at its disposal to attract attention and obtain assistance. There were no substantial changes or additions to Article N6/4, Special Agreements.

The Conference adopted two changes to Article N7/5 to assist in the use and understanding of the Table of Frequency Allocations. The first involved the addition of a new provision at the beginning of the Article which provides a comparative table for the terms allocation, allotment and assignment in the three working languages of the Union. This table was previously contained in Resolution No. 6 of the 1959 Radio Conference. The second change to the Article was the incorporation of the Chart of Regions as Defined in Table of Frequency Allocations, which was previously given in Appendix 24 of the Regulations. No changes were made to the definitions of the three ITU Regions or to the Chart, although this was a matter of considerable discussion in the initial stages of the Conference. Developing countries in general and certain African countries of Region 1 in particular, expressed concern that the existing division of the world into three Regions may not be appropriate to meet the requirements of all countries on an equitable basis. Since it was not possible to reach a decision on this matter during the Conference, Resolution AB was adopted which resolves that the existing geographical division of the world should be reviewed in the light of major developments in radio technology and the increase in membership of the Union with countries at different stages of development. CCIR was requested to undertake a study of the technical and operational bases for a possible revision of the world's Regions for the purposes of allocating frequency bands. The results of the CCIR study are to be available not later than the XVIth Plenary Assembly so that the Plenipotentiary Conference can take action to suitably resolve the issue at one of the future radio conferences.

New terms were also added to the Article for the African broadcasting area and to define a sub-region which is an area consisting of two or more countries in the same Region.

The only significant change to Article N8/6, Special Rules for the Assignment and Use of Frequencies, was the addition of a new provision stating that Members recognize that the safety aspects of radionavigation and other safety services require special measures to ensure freedom from harmful interference.

d. During the general discussion in Committee 5 of the Table of Frequency Allocations and the related provisions, there was some concern expressed about the various country and/or geographical names used in the footnotes of the Allocation Table. The concern related to the implications that might be drawn in the use by the International Telecommunication Union of certain names that were involved in sovereignty or territorial claims. It was the view of Committee 5 that a disclaimer should be placed at the beginning of the Table of Frequency Allocations. In the end, the Conference decided that the disclaimer should be placed at the very beginning of the Radio Regulations in a preamble. The complete text of the preamble is as follows: "The application of the provisions of these regulations by the permanent organs of the International Telecommunication Union does not imply the expression of any opinion whatsoever on the part of the Union concerning the sovereignty or the legal status of any country, territory or geographical area."

e. In an effort to simplify and clarify the Table of Frequency Allocations and the many associated footnotes, Committee 5 spent considerable time developing a set of standardized footnotes that would be used throughout the Table. Uniform footnotes were adopted for alternative allocation, additional allocation, and different category of service, and each footnote of these types is so indicated. Standardized text was also adopted for footnotes dealing with general allocations and footnotes involving the Radioastronomy Service.

f. To improve the utilization of the high frequency band, the U.S. proposed a number of changes to Section 1 of Article N28/7 for the Broadcasting Service. In general, it was recognized that the requirements of shortwave broadcasting could not be met entirely by an increase of frequency allocations, although the U.S. did propose substantial increase in the high frequency bands for this service. The proposed changes would limit the power of transmitters to 50 kilowatts in the case of domestic broadcasting in the HF band with an upper limit of 250 kilowatts for all broadcasting transmitters. Double sideband transmissions were to be discontinued by a specific date to be decided by the 1979 WARC (the U.S. suggested a date of January 1, 1995). A new provision would allow the use of only one frequency per frequency band to broadcast simultaneiously the same program to any single or contiguous zone. This group of proposed changes to improve the technical standards of the HF Broadcasting Service formed a very important part of the United States objectives with respect to this service.

The subject of high frequency allocations was one of the most difficult issues at the Conference, as indicated elsewhere in this report. The Conference did not allocate sufficient new bands for the Broadcasting Service. To further compound the problem of severe congestion in the shortwave broadcasting bands, the Conference decided to defer consideration of technical regulations and improvements until the first session of the scheduled HF Broadcast Planning Conference. The only change adopted for the Broadcasting Service was the addition of a new provision in Article N28/7 that limits the carrier power of broadcasting transmitters in the domestic service to 50 kilowatts which was, in fact, one of the U.S. proposals. In effect, the majority of the U.S. proposals were tabled until the first session of the broadcasting conference called for in new Resolution DI. The Conference also adopted new Recommendation H relating to the preparation of the technical information necessary for the upcoming conference and Recommendation I relating to studies for the introduction of single sideband techniques in the HF Broadcasting Service.

g. The U.S. proposed only a minor editorial change to Article N29 relating to the Fixed Service. The Conference accepted this change and made no others to the Article.

h. Committee 5 also reviewed Article N47, Special Rules relating to the Use of Frequencies in the Aeronautical Mobile Service. The Conference adopted only minor editorial changes to this Article.

i. After much discussion the Conference decided to establish new Article 33A relating to the Radioastronomy Service. The Article contains general provisions, measures to be taken by the Radioastronomy Service and provisions regarding protection to the Radioastronomy Service. The Delegation supported the creation of this new Article since it was considered very useful to collect all of the provisions relating to the Radioastronomy Service in a single place.

F. Work of Committee 6 - Regulatory Procedures Committee

1. The U.S. objectives in Committee 6 were as follows:

a. Provisions relating to the International Frequency Registration Board (IFRB)

The functions of the IFRB are described in Article N9 while provisions relating to the Board's internal organization and operations are contained in Article N10. The provisions of these Articles were generally considered to be adequate and thus only a minor clarification was proposed to Article N9 relating to preparations for Radio Conferences.

b. General Remarks on Coordination and Notification Procedures

The provisions of Articles N11, N12 and N13 relating to the coordination and notification of stations in the space and terrestrial services were essentially adequate as contained in the Radio Regulations. The U.S. believed the existing procedures had served well in accommodating new technology and systems. U.S. proposals for changes to the procedures were aimed primarily at clarifying the intent of the existing provisions.

c. Notification of Terrestrial Stations

Article N12 relates to the notification of frequency assignments to terrestrial stations. The essential features of Article N12 had been in existence since 1959 and were generally adequate. Therefore, minimum changes were proposed in order to clarify the intent of certain regulatory provisions.

Modifications to Article N12 had the following objectives:

1) To take into account the Final Acts of the 1978 World Administrative Radio Conference for the Aeronautical Mobile (R) Service;

2) To suppress certain regulatory provisions consequential to the completion of the steps set forth in Resolution Mar2-12; and

3) To clarify the circumstances under which an earth station that has been recorded with a favorable finding in the Master International Frequency Register will be taken into account by the IFRB during its technical examination relating to harmful interference.

Modifications to Appendix 1 were proposed to improve the accuracy of information in the Master Register and the International Frequency List concerning actual usage of frequency assignments. Such information was particularly desirable with respect to assignments below 27.5 MHz. To accomplish this, the U.S. proposed that Column 10 relating to maximum hours of circuit operation be phased out and Column 11 be revised and used to indicate, as a basic characteristic, the regular hours of operation of the frequency assignment being notified. Consequential changes were necessary to Appendices 1A and 9. A new Appendix 10A was proposed to provide appropriate symbols for use in Column 11.

d. Coordination and Notification of Space Service Stations

Existing procedures provided a three-step process for bringing into use space radiocommunication services. The process of advance publication, coordination, and notification of frequency assignments had proven to be a flexible as well as an effective mechanism for introducing new space networks.

In addition to clarification and simplification, some of the U.S. proposals in this section had the objective of minimizing the burden of coordination, such as when adding new earth stations to an existing network.

Modifications to Articles N11 and N13, dealing with the coordination of space service stations, had the following objectives:

1) To clarify that comments provided by administrations to the IFRB during the advance publication process concerning possible unacceptable interference shall be confined to existing or planned space radiocommunication services;

2) To preclude any possible requirement to coordinate a new space station or earth station assignment with an administration having an assignment for a geostationary satellite system which is not in accord with the Convention, the Table of Frequency Allocations or other provisions of the Radio Regulations;

3) To facilitate satellite inter-system coordination by requiring administrations to provide information in Appendix 1A for typical earth stations in certain situations;

4) To clarify that coordination agreements are based on interference levels and not on increases in noise temperature;

5) To eliminate any requirement to coordinate the addition of new earth stations to an existing satellite network where the potential interference from such stations does not exceed limits agreed to during the initial coordination of the network;

6) To recognize proposed procedures relating to the coordination of mobile earth stations;

7) To clarify that existing space or terrestrial station agreements which have been recorded with a favorable finding in the Master International Frequency Register will be taken into account by the IFRB during its technical examination relating to harmful interference;

8) To provide for an extension of time with respect to the bringing into use of a satellite network due to delays or circumstances beyond the control of the notifying administration; and

9) To provide for periodic review of space radiocommunication entries in the Master International Frequency Register in order to improve the accuracy of the Register.

e. Monitoring, Infringement and Harmful Interference Procedures

Article N18 concerned the international monitoring of radio frequencies. To improve the quality of international monitoring, a modification was proposed to delete the provision whereby stations are permitted to observe lower technical standards than those recommended by the CCIR. Appendix 6 to the Radio Regulations concerned reports of monitoring data and was adequate as it existed.

One change was proposed to Article N19, Reports of Infringements. This would permit an administration, where it has information of an infringement of the Convention or Radio Regulations, to take action against any station, authorized or unauthorized, over which it has authority. Appendix 7 to the Radio Regulations concerned infringement reports and was adequate as stated.

Several changes were proposed to Article N20, Procedure in a Case of Harmful Interference, that were intended to facilitate the resolution of harmful interference cases. Appendix 8, Report of Harmful Interference, was adequate as it existed.

f. Reaccommodation Procedures

The United States proposed a reallocation of certain existing high frequency Fixed Service bands to meet urgent requirements of other radio services. Reallocation of the Fixed Service bands was considered to reflect a decreased need, particularly for international circuits. However, a substantial number of Fixed Service frequency assignments shown in the International Frequency List in bands proposed for reallocation represented valid operational requirements.

Therefore, the U.S. proposed that the 1979 WARC adopt procedures that would ensure reaccommodation of HF fixed assignments in the reallocated bands in an orderly manner, following these principles:

1) Administrations should critically review their assignments in the HF bands allocated to the Fixed Service contained in the Master Register and remove those that no longer represent continuing operations;

2) Responsibility for reaccommodating continuing fixed assignments not compatible with new allocations made by the Conference shall primarily be that of the administration concerned; however, technical assistance will be provided by the International Frequency Registration Board;

3) The transition period over which the reaccommodation will occur should be a reasonable period of approximately 4 to 6 years; and

4) At the end of the transition period during which reaccommodation of Fixed Service frequency assignments are made, all fixed assignments then contained in the Master Register shall receive the same common date. Thereafter, the provisions of Article N12 shall be followed.

g. New Resolutions

A new Resolution No. AA relating to the Amateur Satellite Service was proposed to take into account the uniqueness of this service. Strict compliance with Article 9A did not appear to be feasible due to the fact that earth stations in the Amateur Satellite Service were not assigned specific frequencies and because of the widely varying equipment characteristics that result from the experimental nature of the service.

To recognize the difficulty involved in the advance publication, coordination and notification of information for the Amateur Satellite Service, proposed Resolution No. AA permitted administrations to supply as much information as possible in compliance with Nos. 4100, 4117, etc. Such information supplied for Appendices 1A and 1B would be considered complete and will be published in a special section of the IFRB Weekly Circular.

New Resolution No. BB related to notification of frequency assignments and stipulated that, unless special arrangements were made, frequency assignments for a station should be notified by the administration on whose territory the station is located. This Resolution basically updated existing Resolution No. 5.

New Resolution No. CC relating to notifying frequency assignments under Appendix 1 was also proposed. This Resolution was consequential to changes described above concerning frequency assignment usage and modifications to Columns 10 and 11 of Appendix 1. The Resolution provided interim procedures to assist the IFRB in implementing the proposed changes.

2. The results in Committee 6 were as follows:

a. Provisions Relating to the IFRB

Articles N9 and N10 dealing with the functions of the IFRB were combined into one article with no increase in the authority of the IFRB. The People's Republic of China proposed that the IFRB prepare draft Technical Standards and Rules of Procedure which would be placed on the agenda of a competent World Administrative Radio Conference for consideration and approval. Consideration of this proposal resulted in Resolution AA that:

- requires the distribution of the Technical Standards and Rules of Procedure to all Members of the Union for comment;

- refers the matter to the CCIR in the event of an unresolved disagreement over any Technical Standards;
- refers the matter to a World Administrative Radio Conference in the event of an unresolved disagreement over the substantive contents of the Rules of Procedure; and,
- requires the IFRB to take consequential action, including a review of all relevant findings, after the resolution of the matter.

b. Notification of Terrestrial Stations

1) Extensive discussion was devoted to the adequacy of existing regulatory procedures relating to the registration of frequencies for terrestrial stations as provided for in Article N12. In general, the existing procedures were criticized by developing countries as being based on the principle of first-come, first-served and contrary to their interests, particularly to those administrations that have emerged from colonial status to independence since the last general revision of the Radio Regulations in 1959. This criticism was mainly in terms of their difficulties in obtaining frequencies in the HF band for domestic communications - which is the only practical means of long-distance communications for some countries. The developing countries also tended to criticize the existing regulations as overly complex and, for administrations which have an inadequate frequency management infrastructure, beyond their capability to administer. Thus they argued that even though administrations, strictly speaking, might have equal rights under the regulations, they, in fact, did not enjoy equal rights in practice.

The developed countries essentially contended that the existing procedures were designed to protect registered assignments against harmful interference. It was pointed out that whatever first-come, first-served aspects might exist with respect to Article N12, experience had shown that administrations were not denied access to the spectrum in the HF fixed bands and that real requirements were continuing to be satisfied. The HF fixed spectrum was not in fact saturated although one might conclude otherwise based upon the number of frequency assignments listed in the Master International Frequency Register (MIFR). This problem resulted from the fact that the MIFR contained a number of unused assignments, or "deadwood", together with a number of assignments which were being utilized in a manner inconsistent with their notified characteristics. Both the U.S. and the United Kingdom submitted proposals prior to the Conference to remedy the problems associated with the MIFR.

2) Discussion on possible changes to Article N12 focused on a formal proposal by Algeria to radically alter existing procedures by allocating frequencies in the HF Fixed Service bands on a 70-30 basis in favor of developing countries. The Algerian proposal was not acceptable as a matter of principle to the developed countries and, indeed, to a number of developing countries as well which make extensive use of the radio spectrum. Proponents of the Algerian proposal stressed that their objectives were to secure assured access to the spectrum and, once having access, to be able to operate their stations free from harmful interference. While all countries could support these general objectives, it was apparent that the Algerian proposal did not deal with the asserted shortcomings of the existing procedures but was simply an arbitrary division of spectrum resources with no assurance that the real needs of an administration would be met. It was evident from the outset that some accommodation would be required to meet the perceived needs of the developing countries but on terms acceptable to all administrations attending the Conference, if the workings of the ITU were not to be seriously undermined. This was ultimately accomplished through a succession of informal and then formal contacts and discussions which produced a set of guidelines as the basis for developing specific regulatory provisions in Article N12. An acceptable compromise was worked out based both on proposals submitted prior to the Conference, and proposals which surfaced during the Conference. The U.S. was an active participant and contributor to this process.

The essential elements of the eventual compromise were: (a) removal of unused HF assignments in the Master Frequency Register; (b) reclassification of remaining assignments according to needs and alternative means; (c) identification of new frequencies for HF fixed assignments displaced by allocation changes ("reaccommodation"); (d) increased assistance by the IFRB to countries needing help in finding new frequencies, and in identifying interference; (e) revision of Article N12, and related texts, to implement these procedures. The "package" also included new Resolution BZ to the effect that certain provisions introduced into the Radio Regulations are intended essentially for use by the administrations of developing countries, and that therefore administrations of developed countries should minimize their use of these provisions.

3) The provisions which require the IFRB to select a frequency for an HF station in the Fixed Service for a country also call for existing entries to be modified if that will permit the accommodation of a new assignment. In order to

assist the IFRB and administrations in selecting assignments for stations in the Fixed Service in the HF bands, the assignments will be required to be classified as to their operational status and more precise information furnished on hours of operation.

4) Another modification was to revise the "insistence procedure" whereby an assignment which receives an unfavorable finding due to the probability of interference to an existing assignment is resubmitted to the IFRB stating that no reports of harmful interference have been made. The new provisions call for the IFRB to publish the resubmitted assignment and to notify the administrations that may be affected. The administrations are then to report to the IFRB if interference is caused to their assignments during a two-month period. IFRB action at the end of the period will be determined by the reports, if any, that are received.

5) To maintain the accuracy of the Master Register, provisions were adopted whereby the IFRB is to conduct periodic review of each section by sending to each administration extracts of their entries for review and necessary revision.

6) A special procedure dealing with the removal of unused assignments from the Master Register, classification of assignments, and the reaccommodation of displaced assignments was adopted for the HF bands presently allocated to the Fixed Service. By March 31, 1981 administrations must delete assignments no longer used, classify the remaining assignments according to the degree of interference protection required and indicate the regular hours of operation of the frequency assignment. After the administrations have responded, the IFRB shall prepare and on October 1, 1981 shall publish a provisional section of the Master Register containing the assignments subject to the clean-up procedure. These assignments shall contain a common date in column 2 and the IFRB findings shall be amended with the prescription given in Resolution CT. Additionally, those assignments which are in bands that have been reallocated from the Fixed Service will be annotated to reflect that they must be reaccommodated in bands that remain allocated to the Fixed Service.

7) Under the reaccommodation procedure (Resolution CV), certain provisions of Article N12 will be suspended from January 1, 1982 to June 30, 1984. During this period HF fixed notifications will be considered in accordance with the provisions in Resolution CV. On July 1, 1983 the IFRB shall forward to each administration a proposed replacement frequency for each assignment that was annotated as requiring

reaccommodation. The IFRB shall make every effort to find replacement frequencies as quickly as possible and administrations will notify the IFRB of its agreement to the replacement or which of the replacements it finds unacceptable and the reasons therefor. The IFRB will continue to seek suitable replacement frequencies until July 1, 1984. After this date, an administration must find its own replacement frequencies. Finally, the change-over to the replacement frequencies shall occur not later than July 1, 1989 for the bands above 10 MHz, not later than July 1, 1994 for the bands below 10 MHz, and, the administration shall inform the IFRB of the date on which the change-over occurred.

8) The related Appendices by which frequency assignment data are submitted for coordination and notification purposes were also revised. The major change was the requirement for more information on terrestrial stations. Although not considered a regulatory matter, the adoption of the new method of designating emissions will affect the preparation of notices (see Resolution AK).

The provisions which require the submission of data for inclusion in the various specialized lists of the ITU such as the List of Coast Stations were not changed.

In summary, the U.S. made clear its appreciation and understanding of the problems of the developing countries and played a prominent part in the extensive negotiations required in developing acceptable compromises. These compromises will not have an adverse effect on U.S. interests, although it will cause an increase in workload both domestically and by the IFRB to carry out the clean-up and reaccommodation procedures.

c. Coordination and Notification of Space Service Stations

1) The Conference maintained without major changes the existing three stage process of advance publication, coordination, and notification for frequency assignments relating to space services. The Conference also approved the rearrangement of the procedures relating to space services into two Articles N11 and N13 which represents a considerable improvement and should facilitate their application by administrations. Articles N11 and N13 were considered in minute detail and a number of modifications were made to modify and somewhat simplify the procedures. The provisions dealing with the coordination and notification of terrestrial stations in bands shared with the space services underwent similar changes.

2) Generally speaking, the time periods specified in the regulations for actions or responses by administrations were extended in order to permit more time for compliance by administrations. For example, the period for comment on the advance publication of information by administrations was extended from ninety days to four months. Similarly, the period for examining the coordination data by an administration has been extended from ninety days to four months. Modifications were also made with the objective of ensuring that more complete information concerning space networks is made available to administrations on a timely basis as systems move through the advance publication and coordination phases.

3) Additionally, provisions were modified to more clearly indicate those cases where coordination is required so as to remove existing ambiguity. To ease the burden of coordination, based on experience gained to date in implementing new space systems, the number of situations where no coordination is required was expanded.

4) A provision was added to Article N11 which specifies that the IFRB is to provide certain technical assistance to administrations, particularly to an administration of a country in need of special assistance, in complying with the procedural requirements relating to advance publication and coordination of frequency assignments to space services. This should be of particular benefit to developing nations, for example, in the coordination of domestic earth stations working with domestic or international satellite systems.

5) In order to provide for automatic review of space radiocommunication entries in the MIFR, a provision was added to Article N13 whereby the IFRB, at intervals not exceeding two years, shall request confirmation from the notifying administration that its assignment has been and will continue to be in regular use in accordance with its recorded characteristics. This is intended to keep entries in the MIFR accurate and avoid cluttering the Register with erroneous or unused assignments.

6) New Article 13A was adopted introducing a procedure to be followed when a footnote to the Table of Frequency Allocations requires the agreement, before operating stations under the footnote, of another administration whose services may be affected. This procedure, which provides a means of identifying affected administrations, applies to both the space and terrestrial services.

7) The Final Acts of the 1977 Broadcasting Satellite WARC were brought into the Radio Regulations through adoption of a new Article 13B and a new Appendix 29A (see also Section VII G).

d. Space Services Conference

1) Although the regulatory procedures relating to space services were retained in essentially their same form, they were strongly criticized by developing countries which, in certain cases, favored adoption of formal plans to govern the implementation of space services. This issue was intensely debated during the Conference and led to the adoption of Resolution BP "Relating to the Use of the Geostationary-Satellite Orbit and to the Planning of the Space Services Utilizing It". The Resolution states "that a World Administrative Radio Conference shall be convened not later than 1984 to guarantee in practice for all countries equitable access to the geostationary satellite orbit and the frequency bands allocated to space services".

2) A number of countries (India, China, USSR, Iraq, Afghanistan) proposed that a future WARC be convened to plan certain space services in certain parts of the spectrum. However, there was no agreement among them as to which services or bands should be planned. For example, China proposed that only the new allocations to the Fixed Satellite Service (FSS) below 10 GHz should be planned, whereas India proposed that the FSS including feeder links to the Broadcasting Satellite Service (BSS), would be planned in the entire 4/6 and 11/14 GHz bands. The USSR proposal was the most modest, with planning confined only to BSS feeder links. The Iraqi proposal was the most ambitious, embracing all space services in all frequency bands. A joint proposal by Colombia and certain other equatorial countries spoke of "adopting regulations guaranteeing rational and equitable access to the geostationary satellite orbit". It would also require prior agreement to the use of orbital positions over the territory of equatorial states. Proposals were also submitted during the Conference by Australia, Canada, and France relating to the use of the geostationary orbit.

Early in the consideration of the various proposals, it became clear that there was no opposition per se to the convening of a future space conference. Rather, the focus was directed at whether such a conference should have limited terms of reference confined to developing an a priori plan, or whether it should have broad terms of reference to admit consideration of a wide range of possibilities for guaranteeing equitable access.

3) The proponents of planning were generally in agreement that planning should lead to a detailed plan of orbital position and frequency allotments to countries in the fashion of the 1977 WARC plan for the BSS. Nearly all of the proposals justified the need for a plan on the claims that the geostationary satellite orbit was rapidly filling up in the 4/6 GHz band and that the present regulatory procedures, characterized as "first-come, first-served", would deny equitable access to developing countries in the future. India, which emerged as the leading proponent of planning, contended that it had paid a severe penalty in establishing their domestic satellite system and that the procedures of Article 9A did not adequately realize the principles of equity and access set forth in the ITU Convention.

4) Almost all of the developed countries, including most of the European countries which had supported planning for the BSS in 1977, spoke against the feasibility and desirability of planning for the FSS. They argued that the present regulatory procedures were not strictly first-come, first-served; that these procedures had worked well in the past and could be modified to work even better in the future; and that, if technology were not frozen through imposition of a plan, the geostationary orbit need not become so congested as to deny any country access to it. In addition, they argued that, if planning were to be considered at all, it should not be restricted to the type of detailed assignment plan used for the BSS in 1977.

5) Initially the equatorial countries maintained that new regulatory procedures, rather than planned assignments, were the key to ensuring equitable access. Subsequently, it became apparent that the equatorial countries and the proponents of planning had worked out an accommodation when Algeria proposed the "resolves" section of a resolution. It introduced as a "compromise" the idea of a two-session WARC whose first session would "establish principles, technical parameters and criteria for the planning of the orbit and frequency assignments for space services . . . taking into account relevant aspects of the particular geographic situation of equatorial countries". Although not so specified, the Algerian proposal in essence favored a priori planning with no alternatives. Its failure to consider any other approach than planning and no other type of planning mode but the allotment of frequencies and orbital positions made it unacceptable to the developed nations. The reference to equatorial countries also proved to be unacceptable to many countries which viewed it as a continuing attempt by the equatorial countries to build a case for their claim of sovereignty to that part

of the geostationary satellite orbit located above their territory. The U.S. and others considered the purported "compromise" as premature since the relevant working group had not yet addressed fully all the points within its terms of reference which, in addition to considering "the desirability, feasibility, and possibility of planning space services", was also to consider the "desirability, feasibility, and possibility of other approaches supplemental to the existing provisions of Articles N11 and N13".

6) In subsequent developments, India verbally presented a considerably broadened version of the Algerian proposal that included alternatives to planning, allowed the Space Conference to decide which services and bands should be planned, and did not specify the type of planning. The Indian proposal was accepted as a possible basis for final compromise and the chairman of the working group consulted with the representatives of fifteen of the nations most concerned with the issue (Afghanistan, China, Ecuador, India, Algeria, Iraq, Colombia, Kenya, Somalia, Nigeria, Canada, France, U.K., U.S., USSR). This consultation ultimately produced the resolves section of Resolution BP which, through the addition of paragraphs 3.3 and 3.4, represented from the standpoint of those opposed to a priori planning improvement over the original Algerian proposal since it permitted the consideration of regulatory procedures and other approaches to ensure equitable access. The problem with respect to the reference to equatorial countries contained in the Algerian statement was finally overcome so far as reaching agreement on the wording of the Resolution was concerned with the adoption of the phrase "taking into account the relevant technical characteristics concerning the geographical situation of particular countries".

7) A statement made by the U.S. concerning the "planning" aspects of Resolution BP is as follows:

> "The United States, in a spirit of compromise, can accept in general the proposed Resolution relating to the use of the geostationary satellite orbit and the space services using it. We believe that the text of the Resolution could have been further improved in several respects, but we recognize that it represents the result of lengthy discussion and reflects a sincere effort by all parties to accommodate diverse views.
>
> "The United States accepts the idea of a future space conference - the third since 1963 - as being in keeping with the dynamic development and utilization

of space communication technology. As stated many times in earlier discussions, the United States is of the view that the existing Radio Regulations are responsive to the spirit of Article 33 of the Convention and Resolution No. Spa2-1 of the Radio Regulations and have provided an effective mechanism for those administrations whose space services require access to the geostationary satellite orbit and the radio spectrum.

"However, we also recognize that the Radio Regulations have been criticized by some administrations, and we believe that there is always room for improvement based on experience with the actual application of the Regulations. Indeed, improvements to the Regulations have been undertaken at this Conference and undoubtedly further improvements will be found at the next Space Conference, since that Conference will have as one of its major mandates the establishment of improved regulatory procedures.

"There has been extensive discussion over the nature of the planning to be undertaken at the next Space Conference, and various explanations have been given as to what is intended. For its part, the United States views the planning mandate of the next Space Conference as being very wide in scope, admitting of a broad range of possibilities ranging from detailed orbit/frequency assignment plans to more dynamic planning approaches that will provide access to the orbit/spectrum in an equitable manner as the real requirements of administrations arise. While we are of the view that a flexible and dynamic planning approach will be more responsive to user needs, we believe that the Conference will be free to decide for itself the best approach for ensuring equitable access to the orbit/spectrum based upon careful and comprehensive technical preparations and analysis. In this regard, the full and active support of the CCIR will be indispensable.

"In deciding on the best planning approach, we trust that the future Space Conference will recall the grave problems foreseen by the United States, and also by a number of the countries who favored planning for the Broadcasting Satellite Service in 1977, if 1977 WARC-type planning were to be applied to the Fixed Satellite Service. I shall briefly summarize these difficulties for the record.

"Accommodation of long range requirements predictions with near-term technology

"A detailed orbit-frequency assignment plan would have to try to use proven, near-term technology to accommodate the sum-total of the long-range future requirements of all countries and groups of countries that might possibly want to operate satellite systems. Although the United States is certain that technological advances can expand orbit-spectrum capacity to accommodate all foreseeable real requirements as they arise, we acknowledge that 1984 technology will not be able to accommodate the grand total of 1999 requirements that a planning conference would face.

"Freezing of technology

"A 1977 WARC-type plan would freeze technology which, contrary to some assertions, is still in a state of rapid improvement in the 4/6 GHz band as well as other bands. This would deny the very increases in orbit-spectrum capacity and decreases in cost required for continued efficient and economical use of these limited resources that Article 33 tells us are essential for equitable access.

"Inhomogeneity

"Individual fixed satellite systems vary greatly in their characteristics. This inhomogeneity is intrinsic to fixed satellite networks. Such systems must accommodate in an economic and dynamic fashion a wide variety of numbers and types of channels, even within a single national system. This is why fixed satellite planning is radically different from and much more complex than the broadcasting satellite planning of 1977 which was based on the assumption of completely homogeneous systems.

"Unused orbit/spectrum resources

"Many assignments in a plan will come into use late in the life of the plan, if at all, either because terrestrial techniques will be more economical, or because national requirements may be met more economically by participation in an international or regional system. It is not accurate to say that assignments made to certain countries, which cannot be used for some time, will be made available to other countries. A plan necessarily ties a particular orbital position and frequency assignment to a specific coverage or service area. The interlocking nature of a plan would make it practically impossible for other countries to make use of unused assignments.

"Inflexibility

"The inflexibility of a detailed plan also makes it difficult if not impossible to modify a plan to provide assignments for new countries, or for new regional groupings of countries wishing to establish a shared system. Revision of a plan, if it is to be meaningful, will involve massive changes; it will necessarily be a complex, expensive and time-consuming process; it will need to balance the desire of then-existing systems to keep on operating against the possibility of cancelling assignments for the sake of a new plan. We believe that such substantial revision of a plan will be impractical, technically and economically. Thus, a plan will tend to institute, de facto, a permanent or semi-permanent priority, contrary to the principles stated in Resolution No. Spa2-1.

"For all of these reasons, the United States holds that the words 'planned' and 'planning' in the draft Resolution must be interpreted in a broad and flexible sense. With this interpretation of planning and with the obligation to consider a variety of alternative approaches to the use of the orbit-spectrum resource by space services, the next Space Conference can lead to the full realization of the objective of equitable access to the resource that the United States has always supported."

8) Thus, after extended debate, Resolution BP was adopted to hold a Space WARC whose principal goal was to guarantee equitable access to all countries and groups of countries. The Conference would take place in two sessions with the first session slated for about 1984 and the second session a year to a year and a half later. (Scheduling for future conferences is the responsibility of the Administrative Council of the ITU and the upcoming Plenipotentiary Conference, based on budgetary and other concerns. The date here is only a suggested date.) The first session would decide which -- if any, in the U.S. view -- services and frequency bands should be planned, and would be free to decide on the principles of

planning to be employed in each case, as well as the criteria and technical parameters for the planning. In the process of deciding where planning may be appropriate, other approaches to meeting the goal of equitable access would be considered, including improved regulatory procedures. The second session of the conference would then carry out the decisions of the first session. The proposed future conference to consider planning of space services using the geostationary satellite orbit has a mandate which appears to be satisfactorily broad to allow full discussion of alternative means of securing equitable access to the spectrum/orbit. It should be recognized, however, that pressures to adopt a priori planning for some of the FSS bands (4/6 and 11/14 GHz) which were manifest at WARC-79, will be very strong at the Space WARC and must be taken into account as the U.S. prepares for this conference.

e. Monitoring, Infringement and Harmful Interference Procedures

The role of the international monitoring service (Article N18) was increased at the WARC in three key areas:

1) To assist the ITU in "clearing" frequencies for new users;

2) In achieving increased technical tolerances and eliminating interference among shared services;

3) In controlling interference and establishing sharing criteria among users of the geostationary orbit.

Recommendation D, International Monitoring, was increased in scope to cover all frequencies in the spectrum as well as modified to encourage assisting the IFRB in determining which entries of the Master Frequency Register may be deleted in reaccommodating Fixed Service assignments so that additional broadcasting frequencies can be made available. Recommendation XH relating to practical needs of developing countries recommends that administrations make special efforts to furnish monitoring information and other technical assistance that would aid in obtaining proper frequency assignments (interference free or interference minimized).

Article 19 (Reports of Infringements) was carried forward with only minor amendments in order to clarify the existing text.

Article N20 (Procedure in a Case of Harmful Interference) was amended to reflect:

- that an administration shall acknowledge, by telegram, the receipt of a complaint of harmful interference.

Such acknowledgement shall not constitute an acceptance of responsibility for the harmful interference;

- new provisions relating to the elimination of harmful interference to safety services and, in particular, to transmissions on the distress and safety frequencies; and,
- a more detailed procedure to be followed by an administration in special need to determine the source of harmful interference.

Appendices 6, 7 and 8 (Reports of Monitoring, Infringements, and Harmful Interference) were amended to define more precisely the data required in these reports. The monitoring report (Appendix 6) was updated to allow for the gathering of information in the space radiocommunication services.

f. Resolutions

Three proposals concerning resolutions affecting regulatory matters were submitted by the U.S. Proposed Resolution AA was adopted in modified form (Resolution BV) consistent with U.S. objectives to recognize the difficulty involved in the advance publication, coordination and notification of information for the Amateur Satellite Service.

Proposed Resolution BB to update Resolution 5 relating to notification of frequency assignments was adopted (Resolution CA). Proposed Resolution CC related to changes in Appendix 1 concerning information on frequency assignment usage. Inasmuch as the Conference adopted our proposal for Appendix 1 in modified form, Resolution CC became inapplicable and was withdrawn.

G. Work of Committee 7 - General Administrative Committee

1. The work of Committee 7 dealt primarily with the general administrative and operational matters of the radio services, as well as with several other miscellaneous items not falling clearly under the work of the Technical, Allocations and Regulatory Committees. The changes to the Radio Regulations proposed by the U.S. in this category were intended to clarify and strengthen the intent of the provisions, to provide for the flexibility required by administrations, to eliminate superfluous regulations, and to provide for the safety of medical transports. The U.S. objectives in this area were nearly all satisfied.

2. A summary of our specific objectives and the Conference results is as follows:

a. Definitions and Nomenclature

Committee 7, working closely with Committees 4, 5 and 8, was also involved in the consideration of definitions and terminology. The specific changes, and in particular, new definitions added to the Radio Regulations, are discussed elsewhere in this report under the work of other Committees. However, the Committee did treat one question of substance in its deliberations, namely, whether the Conference was competent to make changes to definitions appearing also in the Convention. It was confirmed that the 1979 WARC could not modify the Convention; however, if the Conference decided to amend provisions of the Radio Regulations which are also covered in the Convention, it could submit a resolution to the Plenipotentiary Conference seeking a revision of the related text of the Convention. This served as a guideline throughout the Conference for the work of all Committees relating to definitions.

The Conference adopted a new Article N2A concerning the nomenclature of dates and times used in radiocommunication. The new Article requires the use of any date to be in accordance with the Gregorian calendar, establishes an all-numeric format for representing the day, month and year and describes the method for using coordinated universal time (UTC).

b. Secrecy and Licenses

As currently written, Article N21/17 concerning the secrecy of radiocommunications was considered to be adequate for its intended purpose. The only change proposed by the U.S. was a modification to draw attention to the related Article of the ITU Convention, Malaga-Torremolinos, 1973. The Conference modified the Article to include a general reference to the appropriate provisions of the Convention.

The provisions of Article N22/18 which concern licensing of stations, were considered to be generally adequate and required few changes. The U.S. did propose some changes to this Article to allow flexibility for administrations in licensing and in complying with the secrecy requirements. The Conference did not accept all of the U.S. proposals; however, this is not expected to adversely affect the existing procedures of the Federal Communications Commission as the U.S. licensing authority.

c. Identification of Stations

Several changes were proposed to Article N23/19 in order to improve spectrum utilization. The proposed changes urged the early introduction of automatic identification methods in general and the observance of CCIR Recommendations for identification on frequencies for international use. Several other proposals relating to identification of stations were for the purpose of aligning the provisions with existing practices and to clarify their intent. Appendix C was considered adequate and no changes were proposed.

The Conference made substantial changes to Article N23. Provisions were added to encourage the use of automatic transmission of identification signals where practicable and in appropriate services. Other new provisions were added to clarify which radio services are required to use identification signals as well as the specific form of such signals. A major change to the Article was the adoption of a new system for Maritime Mobile Service identities, including national identification digits contained in new Appendix CA. The new maritime provisions are the result of several years of study in CCIR and CCITT. Finally, a number of minor changes were made to the sections dealing with the formation of call signs for the various radio services and stations.

Consideration of Article N23 was severely complicated by a political issue involving call signs. Both North and South Korea came to the Conference prepared to do battle over the assignment of call signs between the two countries. The North demanded one-half of the call sign series HLA-HMZ which had been assigned to the "Republic of Korea" since 1959 but which had previously been assigned to "Korea". Since the Democratic People's Republic of Korea was not a Member of the ITU at the time when the assignment was changed, it claimed the assignment was invalid for want of representation of its interests. South Korea resisted the 50-50 split on the grounds that the 1959 designation had been proper and that call signs had legitimately come to be associated with the Republic of Korea. The issue consumed excessive time and patience as each side lobbied every delegation repeatedly. The issue was finally settled by secret ballot on a compromise proposal initiated by the Republic of Korea. The compromise resulted in the splitting of the call sign series in half with a footnote in the call sign table (Appendix C) that the changes would be undertaken as soon as practicable and in any case be completed by January 1, 1984.

A second call sign issue involved the U.S. in a purely political matter. The Delegation was instructed to object to a Soviet proposal to re-designate the call signs of Lithuania, Latvia and Estonia to read "USSR" on the ground that we did not recognize the "forcible incorporation of these countries into the Soviet Union". The U.S. stood alone in this position and the Conference adopted the change as proposed.

d. Service Documents

Article N24/20 specifies the service documents to be published by the Secretary General. The U.S. proposed changes to these provisions that provided for computer access to this information and removed the assumption that only hard copy form is available. It was the U.S. view that significant cost reductions could result with the possibility of computer access. Proposals were also made to delete the requirements for the Secretary General to publish little-used documents in an attempt to reduce costs. The U.S. proposed consequential changes to Appendix 9 contingent on the proposals to delete certain service documents.

The Conference adopted a modification to the Article which provides for the availability of published information in alternative forms, for example, computer tapes. The modification was agreed on the condition that in the application of this provision, the Secretary General would ensure that in no way would there be direct access to any part of the Master International Frequency Register, with the exception of those parts contained in published lists. Provisions for the publication of the Manual for Use by the Maritime Mobile and Maritime Mobile Satellite Services were included in Article N24. Other changes were made to the Article to clarify the publication schedule for the various lists.

With respect to Radiocommunications Statistics, the Conference noted that the General Secretariat had ceased the publication of a separate document and that the information was now included in the Annual Yearbook of Telecommunication Statistics. The Conference endorsed the continuation of this action.

e. Miscellaneous and Special Services

In general, it was not intended that the 1979 WARC would treat Articles pertaining to a single service since these regulations are better handled at a specialized WARC. However, a number of Articles relating to a single service were specifically included in the Conference agenda because they had not been reviewed since the 1959 Conference. The Articles are as follows: Article N30/41, Amateur Service and Amateur Satellite Service; Article N31, Standard Frequency Service and Time Signal Service; Article N32/42, Experimental Stations; Article N33, Radiodetermination Service and Radiodetermination Satellite Service (selected sections); and Article N39, Special Services Relating to Safety.

The U.S. proposals relating to the Articles listed above were minimal and generally minor in nature. Most of the proposed changes were intended to strengthen or clarify the intended purpose of the provision. The most significant U.S. proposal concerned the Article dealing with the Amateur Service. It was proposed that the mandatory Morse Code requirement for amateur operators be deleted and that the Regulation be modified to make the Code requirement a recommended practice. The Conference did not accept this proposal.

Changes to the Articles relating to miscellaneous and special services that were adopted by the Conference are minor and fully acceptable to the U.S. In Article N30/41, a provision was added which forbids the use of amateur stations for transmitting international communications on behalf of third parties; however, the existing paragraph which permits special arrangements between administrations of countries concerned is applicable in this case. Another new provision in this Article extends the existing provisions concerning licensing and operating procedures in the Amateur Service to the Amateur Satellite Service. The Conference made no significant changes to Articles N31 and N32/42. Article N33 concerning radiodetermination was modified to add new regulations which extend most of the existing general provisions to the Maritime and Aeronautical Radionavigation Satellite Services. Finally, the Conference adopted only minor editorial changes to Article N39 dealing with special safety services.

f. Entry into Force of the Radio Regulations

Committee 7 was responsible for revision of Article N73 concerning the effective date of the new Radio Regulations. The results of the Conference decisions on this matter are discussed in Section XIII of this report.

g. Medical Transport

Committee 7 also considered proposals on the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Convention and any additional instrument of the Convention. In this regard, Protocol I of the 1977 Diplomatic Conference on Humanitarian Law specified the protection requirements.

In order to satisfy these requirements and in accordance with results of the SPM, the U.S. proposed modifications and additions to Articles N12/9, N23, N37 and N39. The changes generally applied to the notification of frequencies, identification of stations, general provisions for identifying medical transports, and the content of the medical transport message. The Conference adopted optional procedures which fully satisfy the requirements for medical transport. Most of the new provisions are contained in a new section in Article N37 and the title of that Article was modified as follows: "Urgency and Safety Transmissions. Transmissions Relating to Medical Transports". Appropriate changes were also made to a number of other articles in the Regulations.

h. Program of Future Conferences

The agenda for the 1979 WARC included an item to recommend a program of future administrative radio conferences to deal with specific services with a view to presenting advice to the Administrative Council and subsequently to the Plenipotentiary Conference. The U.S. did not submit specific proposals to the Conference concerning this item, although it recognized that a series of specialized conferences would be necessary in order to implement the decisions of the Conference, to update the operational regulations as required by these changes, and to provide for future growth of specific services. The Delegation participated fully in the related discussions and a report of the results is given in Section IX of this report.

i. The Final Acts of the 1977 Broadcasting Satellite WARC

Committee 7 was tasked with consideration of Resolution No. Sat-4 of the World Broadcasting Satellite Administrative Radio Conference, Geneva, 1977 which called for the incorporation of the Final Acts of that Conference into the Radio Regulations without substantial change. This action was taken by the Conference through a number of changes to the Regulations. The basic provision in the body of the Regulations is contained in a new Article N13B concerning coordination, notification and recording of frequency assignments to stations of the Broadcasting Satellite Service in the 12 GHz band. The single provision in this Article calls attention to the provisions and associated plan now contained in new Appendix 29A. Consequential changes were made in Articles N11, N12 and N13 with regard to the Broadcasting Satellite Service provisions.

Appendix 29A includes nearly the entire Final Acts of the 1977 Broadcasting Satellite WARC as consequentially amended to reflect incorporation of these Acts into the Regulations. The interim provisions for Region 2 that are contained in the new Appendix 29A are modified by Resolution CI to take into account changes made by the 1979 WARC to the Table of Frequency Allocations for Region 2 in the band 11.7-12.7 GHz. Resolutions CH, CJ and CK are also applicable to the new Article N13B and the new Appendix 29A.

H. Work of Committee 8 - Restructure Committee

The Committee had a relatively short agenda and a small number of specific proposals to consider, compared to the other substantive Committees, and its work was non-controversial. Both items in its terms of reference had been thoroughly studied by earlier ITU bodies and had received wide acceptance internationally prior to the WARC. The issues were as follows:

1. Rearrangement of the Radio Regulations

a. The United States was an active participant in the Group of Experts that met in January 1976 to rearrange the Radio Regulations in accordance with Resolution No. 768 of the 30th Session of the Administrative Council. The Rearrangement, which was considered by the 1977 Broadcasting Satellite WARC and adopted in principle as the basis for discussions at the 1979 WARC (Resolution No. Sat-10), reflected the best efforts of those knowledgeable in the Radio Regulations. As in all ITU deliberations the final product represented a number of compromises by the experts to obtain a unanimously agreed report. In addition, in separating the administrative regulations from the operational regulations and the latter by the various services concerned, it was necessary to leave some of the editorial refinement and the deletion of redundant information to the 1979 Conference because of the limited terms of reference of the Group of Experts. It was also necessary due to the press of time for the Group of Experts and the 1977 WARC to leave to the 1979 Conference any further refinement of the Rearrangement itself.

b. The U.S. fully supported the adoption of the Rearrangement and was opposed to consideration of any major changes. In general, our proposals dealt with minor refinements and consequential revisions resulting from the Rearrangement, and several minor changes necessary to correct errors in the Rearrangement. The U.S. proposed suppression of a number of redundant provisions from the Aeronautical and Land Mobile chapters and other editorial refinements. To avoid making substantive changes the Group of Experts triplicated the general Mobile Service provisions in the Aeronautical, Maritime and Land Mobile chapters with the understanding that any provisions that are not applicable to a particular chapter would be treated by the first competent WARC. It was with this understanding that we submitted our proposals.

c. In the course of the work by the Group of Experts a number of recommendations were made to improve the format of the Radio Regulations. The U.S. supported all the recommendations contained in the report of the Group of Experts. In particular, it was felt to be useful to leave blocks of unallocated marginal serial numbers at the end of each article to accommodate expansion of the Regulations and to group Resolutions and Recommendations by conferences of the same type. In rearranging the Radio Regulations, a small number of provisions were duplicated exactly for informational purposes at other places in the Regulations. The U.S. proposed that a footnote be added to each duplicate provision which would read: "This provision is a duplicate of the main provision and can be modified or deleted only as a consequence of a change to the main provision". The provisions that have been duplicated but slightly modified would be considered independently of each other and did not need such a footnote.

d. The basic structure was adopted immediately and unanimously by the 1979 WARC. The concept of two parts -- A and B -- was retained, noting that together they form the Radio Regulations and are fully equal in status. Appendices were located at the end of the Regulations, rather than divided and placed at the end of Part A or B as appropriate as some countries proposed. It was agreed that marginal numbering should begin at 1. It was left to the Secretary General to assign the marginal numbers after the Conference was completed and to place unused blocks of numbers after each section in Article N1 (Definitions) and at the end of each article. The objective was to make it easier to add new regulations at future conferences without going to complex alphanumeric designators which required up to three digits and three letters for certain provisions adopted by earlier conferences.

e. A number of proposals submitted for the Rearrangement were considered to be beyond the competence of the Conference and therefore rejected. For example, there was a series of proposals that dealt with the maritime distress frequencies, including some of the U.S. proposals. The Delegation, acting jointly with the UK Delegation, submitted revised proposals that were within the Conference's guidelines with respect to competency. This action expedited the work of the Committee considerably. All U.S. proposals for the Rearrangement were adopted or handled in a fully acceptable manner.

2. Accounting Provisions

a. The 1974 Maritime WARC adopted a number of changes to the maritime accounting provisions of the Regulations; however, agreement could not be reached on several important issues. The

Conference therefore adopted a Resolution calling on the CCITT as a matter of urgency to study what changes to the principles and methods of accounting for maritime public correspondence are necessary to improve the present system and to provide the results prior to the 1979 WARC.

b. The CCITT studied this issue in considerable detail in the period following the 1974 Maritime WARC. Provisional recommendations were developed by the CCITT and approved by correspondence within that body. They proposed changes that would restructure the framework of ITU provisions dealing with accounting and operating procedures for public correspondence in the Maritime Mobile Service. These changes transferred from the Radio Regulations and the Additional Radio Regulations to the CCITT Recommendations, all such procedures which do not require continued regulatory status. Such transfer would permit easier revision of accounting and operating procedures to respond to future needs and circumstances. Specific changes were also made to some CCITT Recommendations that improved the methods of charging, accounting and refunding. The U.S. fully supported the CCITT Recommendations and submitted proposals to suppress several articles of the Radio Regulations and to incorporate the CCITT's recommended regulatory provisions into the Regulations as a new Article N62A.

c. The Committee considered the Report of the CCITT Director on this matter and quickly endorsed its Recommendations, leaving the difficult question of the extent to which certain articles of the Radio Regulations and the Additional Radio Regulations might be deleted. Concern was expressed that the CCITT studies only considered the Maritime Mobile Service whereas some of the articles proposed for deletion were applicable to the Aeronautical and Land Mobile Services. It was recognized, however, that there was very little if any international public correspondence in the latter two services at this time, with the exception of aircraft working into coast stations that must follow the maritime procedures in any event. There was also a strong sentiment to simplify the Regulations and to make the operating and tariff provisions easier to change, such as they would be if transferred to CCITT Recommendations.

d. The Committee agreed to delete Articles N69, N70, N71 and N72 and adopted a Resolution to ensure that services other than maritime were covered until a more permanent solution could be developed by the CCITT. A new Article N62A, containing the basic regulations for accounting and appropriate linkage to the CCITT Recommendations, was adopted. As a result of these actions, a number of existing Resolutions and Recommendations were deleted. Finally, new Resolution AC relating to the eventual abolition (called for on December 31, 1987 in current CCITT work) of mobile station charges for public correspondence in the Maritime Mobile Service was approved.

e. The Committee also agreed that the entirety of the Additional Radio Regulations (ARR) should be deleted. The ARR is a separate body of administrative regulations annexed to the ITU Convention, along with the Radio Regulations and the Telegraph and Telephone Regulations. They have existed as a separate entity for many years and past conferences treating the ARR have adopted separate Final Acts containing the changes. The reason for the existence of these Regulations is that the U.S. and a few other countries could not agree to the provisions relating to tariffs due to a conflict with domestic law and regulations. As an expediency, the unacceptable Regulations were segregated from the Radio Regulations and the U.S. has never ratified the ARR or signed the relevant Final Acts. Therefore, the Delegation was pleased with this Conference decision.

I. Work of Committee 9 - Editorial Committee

1. Committee 9 held its first meeting in the second week of the Conference to discuss its terms of reference and organization. In accordance with tradition, the Committee was chaired by France. Delegates from the UK, Spain and the U.S. and officials of the ITU General Secretariat participated actively. The purpose of the Committee was to consider every text approved by the five substantive Committees of the Conference — Committees 4, 5, 6, 7 and 8 — and to submit to Plenary texts altered pursuant to its terms of reference.

2. There were two notable differences from past conferences regarding the Editorial Committee of the 1979 WARC. First, there were drafting groups set up in several of the substantive Committees in an effort to align the texts at a much earlier stage in the Conference deliberations. This proved to be very useful since the drafting groups consisted of specialists very familiar with the matter under consideration. The members of the Editorial Committee, as generalists, were able to pay less attention to the technical accuracy and devote themselves to the examination of the texts from the point of view of comprehension by future readers. The second difference was the unexpected but welcome participation by other delegates — from the Ivory Coast, Nigeria, Argentina and Venezuela — who desired to take an active role in this important function.

3. The Committee began meeting regularly about midway through the Conference. In addition to treating the early decisions of other Committees during this period, it carried out a complete, methodical examination of all provisions to identify and correct

serious differences in translation between the three official language versions of the Radio Regulations. This review revealed a number of serious inconsistencies that had developed over the years and were not detected at the various specialized conferences. As is typical of all ITU administrative radio conferences, the workload greatly increased in the last few weeks, requiring the Committee to divide into two or three parts and to extend their sessions long into the night in order to process their texts. The product of their work is reflected in the more than 1100 pages of the Final Acts of the Conference.

VIII. WORK OF THE CONFERENCE (PLENARY SESSIONS)

A. Most of the substantive work of the Conference took place at Committee, Working Group and sub-Working Group levels and is described in Section VII. The vast majority of work in Plenary involved the approval of texts adopted by the main Committees and edited by Committee 9. Unfortunately, this work was often difficult and tedious, due in large part to the unfamiliarity of the Chairman and many delegates with the Radio Regulations. There were long, unnecessary discussions in the first readings of text, and the sessions were often marked with confusion, misunderstanding and misinterpretations. The situation was much improved in the final Plenaries dealing with the second readings where the pace of work became more quick and orderly.

B. The first Plenary meeting, which was scheduled for Monday, September 24, was not held until late in the afternoon on Thursday, September 27, due to the delay in reaching agreement on a slate of officers. In accordance with the Convention, the Conference was opened by the oldest head of delegation, Mr. Per Mortensen of Norway. He announced that the meeting of the heads of delegation had unanimously decided to propose Mr. Severini for Chairman, who was accepted by acclamation and took the chair for the rest of the Conference. Following the election of Vice-Chairmen, opening addresses were given by Secretary General Mili, IFRB Chairman Fujiki, and CCIR Director Kirby. The Conference structure and organization and the slate of officers for Committee Chairmen and Vice-Chairmen were adopted as recommended by the meeting of the heads of delegation. The Credentials Committee was directed to submit a final report not later than November 19. The customary working hours of 0900-1200 hours and 1400-1700 hours were adopted for the 1979 WARC.

The Plenary took note of a message from the President of the United States transmitted to the Secretary General with his good wishes for the work of the Conference. The first Plenary closed after a number of statements were presented as follows:

1. The U.N. representative read a message from the Secretary General of the United Nations stressing the vital role of communications for developing countries, congratulating the ITU on its continuing efforts to encourage and promote the use of telecommunications to the advantage of all nations, and sending his best wishes for a rewarding conference.

2. The delegate from Colombia presented a statement that repeated its claim regarding the sovereignty over the geostationary orbit above their territory. He pointed out that the WARC was not competent to allocate positions on the geostationary orbit to individual countries and that the U.N. Committee on the Peaceful Uses of Outer Space is dealing with the legal aspects of this matter. In general, he noted that communications has gained political importance and that ITU conferences no longer have mere technical implications. The Colombian delegate stated that politics is increasing in the ITU and that this trend cannot be avoided.

3. The delegate of Costa Rica commented about the injustice of the present communications systems and the distribution of frequencies among nations. She spoke of the control and exploitation of the geostationary orbit by a few nations (not identified) at the expense of the developing nations. While briefly stating that the Conference does indeed have a technical base, the Costa Rican delegate declared that the distribution of frequencies and the regulatory structure is obviously political. She said that social, economic and political factors must now set the priorities for the WARC.

4. The delegate of Afghanistan made a statement praising his new Government. Mention was also made of Afghanistan's underdeveloped condition and the need for the Conference to give special concessions in the HF and VHF bands.

C. The second Plenary meeting was not held until the seventh week of the Conference, when sufficient texts had been approved by the Committees to justify consideration by the Plenary. The second and subsequent Plenaries were essentially uneventful, dealing with the series of texts submitted by the Editorial Committee for first reading. The treatment of the documents was painfully slow due to constant minor interventions which dragged out discussion much beyond what was necessary. However, during the second Plenary the Greek delegate made a strong statement expressing his concern at the lack of additional allocations to the Maritime Mobile Service, particularly in the MF and HF bands. He cited a similar problems for the HF Broadcasting Service. He pleaded for the support of all delegations to avert disaster by providing the necessary increases for the two services. There was no discussion of his statement and the request obviously went unheeded by the majority of countries. Also, in the second Plenary, a statement from the Minister of Posts and Telecommunications of the Ivory Coast was noted, a lengthy address was delivered by the observer for UNESCO, and a short statement was delivered by the observer for the World Health Organization.

D. The final Plenary meetings generally moved quickly through the second reading of texts. It was obvious that the long Conference was taking a heavy toll on the strength and interest of the delegates. At certain times during the last week there was no work to be considered due to the delay in reproducing and distributing texts, while at other times the Plenary worked late in the evening to process whatever was available. The most significant substantive decision taken at Plenary was probably the question of allocations in the 3.4-3.7 GHz and 4.5-4.8 GHz bands, which overturned an earlier decision at Committee 5 level and resulted in a compromise acceptable to the U.S. Another item which introduced much heated discussion in the last working Plenary meeting concerned the Protocol statement (No. 79) submitted by Colombia and other equatorial countries. In general, while the principal discussions and decisions were taken at the Committee level, the Plenary sessions tended to be long and tedious.

E. The final Plenary was held on Thursday, December 6, 1979 at 6:40 p.m. for the signature ceremony and the formal closure of the Conference. The Final Acts and Final Protocol were signed by 132 heads of delegation, some of whom did so in advance. Closing speeches were made by Secretary General Mili, Mr. Jipguep, current Chairman of the Administrative Council, and Mr. Severini. The Conference was concluded at 8:10 p.m.

IX. FUTURE MEETINGS

A. For the first time at any WARC the agenda called for the Conference to propose to the Administrative Council and to the next Plenipotentiary Conference a program for convening future administrative radio conferences to deal with specific services. This item was handled in Committee 7. Contrary to popular belief, the decision to recommend a series of future specialized conferences was not an "escape route" for unresolved issues, but rather, it was a necessary exercise in recognition of the fact that the 1979 WARC did not have the mandate to carry out planning, to review the general Mobile Service provisions (which comprise about half of the volume of the Regulations) or to treat certain other parts of the Radio Regulations.

B. The 1979 WARC adopted a number of resolutions and recommendations laying out each specialized world or regional conference, a suggested agenda and in most cases a tentative date. The program of future conferences is summarized in Recommendation XM. The following is a list of the administrative radio conferences agreed with the relevant resolution or recommendation given in parenthesis:

1. WARC for the Mobile Services (Resolution DH).
2. WARC for Planning of the HF Broadcasting Bands - two sessions (Resolution DI).
3. WARC on the Use of the Geostationary Satellite Orbit and the planning of Space Services Utilizing It - two sessions (Resolution BP).
4. Region 2 Medium Frequency Broadcasting Conference - final session (already arranged for November 1981).
5. Region 2 Broadcasting Satellite Planning Conference (Resolution CH).
6. Planning Conference for Sound Broadcasting in the Band 87.5 - 108 MHz for Region 1 and certain countries in Region 3 (Resolution BM).
7. Regions 1 and 3 Conference for Planning Feeder Links to Broadcasting Satellites in the 12 GHz Band (Resolution BQ).
8. Region 3 Conference to Establish Sharing Criteria for the Use of VHF and UHF Bands (Resolution DK).
9. Conference to Revise the Plan of the Copenhagen Convention (1948) for the European Maritime Area (Recommendation YD).
10. Conference Concerning the Provisions of the African VHF/UHF Broadcasting Conference, Geneva, 1963 (Resolution CQ).
11. Region 2 Planning Conference for Broadcasting in the Band 1605-1705 kHz (Recommendation YC).
12. WARC Concerning the Frequency Allotment Plan of the Aeronautical Mobile (OR) Service (Recommendation YF).

C. The program of future conferences is very ambitious and may be impossible to follow in practice. It places a heavy preparatory burden on all administrations, particularly on developing countries. It will be very difficult to carry out adequate and complete technical preparations by the CCIR and the IFRB which have already been heavily tasked by the 1979 WARC decisions. Personnel and budget resources in both the ITU and individual administrations are probably insufficient to meet the proposed schedule, or, at best, will be severely strained.

D. In the end, the U.S. Delegation agreed to all the resolutions and recommendations laying out the conference schedule. Each conference involving Region 2 (Western Hemisphere) will treat radio matters of at least substantial — and sometimes vital -- interest to the United States. Active participation in all such radio conferences is essential for the U.S. in order to serve and protect our national interest and because of our strong commitment to international agreement and harmony in the use of the frequency spectrum and the geostationary orbit. It is, therefore, very important that the concerned Government agencies, private industry and the affected radio user groups be aware of the program described above and carry out early planning to ensure adequate resources are available to prepare for and participate in the various conferences.

E. The U.S. must also prepare for a series of follow-on bilateral and international meetings arising from the 1979 WARC. These meetings will arise in three main areas: changes to existing agreements, implementation of new services and frequency bands, and preparation for future conferences. They will involve bilateral discussions with our neighbors, Canada and Mexico, as well as multilateral meetings in the Region (CITEL) and with our NATO allies. There will also be substantial activity in the CCIR and the various international service organizations (INTELSAT, IMCO, and ICAO) in preparation for the future conferences.

X. IMPACT ON THE ITU PERMANENT ORGANS

A. CCIR: A tremendous work program is laid out in twenty-six Resolutions and forty-nine Recommendations adopted by the 1979 WARC, involving a large number of new studies and action items by the CCIR, as well as many issues currently under study. Most of the new tasks can be grouped in several categories, as follows:

1. Preparation for all future administrative radio conferences, including several issues that must be studied on an urgent basis due to the early date of the relevant conference. Some future conferences may require a special joint meeting of the CCIR Study Groups such as that held prior to the 1979 WARC.

2. Study of various technical regulations, including space/space and space/terrestrial sharing criteria, calculation of coordination distances, frequency tolerances, spurious emission levels, emission designators, and necessary bandwidths. A new feature of CCIR activity is the automatic updating of propagation data in Appendix 28 following each Plenary meeting. Another new task of the CCIR is to study the IFRB's technical standards on a case-by-case basis when disagreement arises, and issue an appropriate recommendation.

3. General study of technical definitions, with a specific request to define terms for "channel", "service area" and "coverage area".

4. Issues related to allocation matters such as the technical basis for division of the world into Regions, protection from ISM equipments, characteristics and preferred bands for sound broadcast satellites in the 500 - 2000 MHz band, and the use of certain radionavigation bands.

5. Technical cooperation and assistance, e.g., development of specifications for low cost television receivers and preparation of a handbook for computer-aided techniques in radio frequency management.

6. Miscellaneous items, two of which are of particular interest to the United States. The first recommends the CCIR undertake studies on the transmission of electrical power from space (solar power satellites) and make appropriate recommendations (Recommendation XO). The second requests the CCIR to develop a standard method of implementing a system for automatic identification of stations (Recommendation XN).

B. IFRB: There was a substantial increase in the tasks to be performed by the Board as a result of WARC decisions. At the same time there was little if any reduction in existing functions assigned to the Board. Therefore, it is anticipated that the IFRB will require additional personnel and/or resources for the next few years to carry out its responsibilities. The substantial increase in workload results primarily from the following decisions:

1. Clean-up of the Master Register in the bands allocated to the Fixed Service between 3000 and 27,500 kHz (Resolution CT);

2. Review of frequency assignment entries in the Master Register resulting from decisions of the 1959 Conference for conformity with the revised Allocation Table (Resolution CU);

3. General review of all frequency assignments in the Master Register for conformity with the revised Table of Frequency Allocations;

4. Reaccommodation of affected frequency assignments in the HF Fixed Service as a result of reallocations to the Maritime Mobile and Broadcasting Services (Resolution CV);

5. Preparation of a handbook to help administrations apply the regulatory procedures of the Radio Regulations (Resolution BW), and other explanatory information (Resolution AK and Recommendation K);

6. Provision of technical assistance and the preparation and organization for future conferences, particularly those dealing with planning of various services. This includes the receipt and processing of frequency requirements and the development of planning methodology and computer programs.

XI. TECHNICAL COOPERATION AND ASSISTANCE

A. During the course of the Conference there was a strong sentiment on the part of delegations from developing countries that there should be new or increased efforts to assist them with technical cooperation and assistance in the field of telecommunications. In particular, they were keenly interested in achieving their rights, as well as in meeting their responsibilities, under the ITU Radio Regulations. The primary means of expression were the various resolutions and recommendations described below that they drafted and the Conference adopted. However, provisions were also inserted directly in the body of the Regulations. An example is the addition of a provision in Article N11 which specifies that the IFRB is to provide certain technical assistance, particularly to administrations of countries in need of special assistance in complying with the procedural requirements relating to advance publication and coordination of frequency assignments to space services.

B. The Conference adopted fifteen resolutions and recommendations that relate directly to technical cooperation and assistance to developing countries. They may conveniently be divided into several categories as follows:

1. Application of the Radio Regulations:

   -- Resolution BW, Relating to the preparation of a handbook to explain and illustrate the procedures of the Radio Regulations.

2. National Radio Frequency Management:

   -- Resolution DD, Relating to the development of national radio frequency management.

   -- Resolution BX, Relating to the introduction and development of computer assistance in radio frequency management within administrations.

   -- Recommendation YG, Relating to a handbook for computer-aided techniques in radio frequency management.

   -- Recommendation XH, Relating to the practical needs of countries in need of special assistance.

3. Operation of Networks:

   -- Resolution BZ, Relating to improvements in assistance to developing countries in securing access to the HF bands for their Fixed Services and in ensuring protection of their assignments from harmful interference.

   -- Resolution CT, Relating to CCIR study of lightning protection of radio equipment.

-- Resolution CG, Relating to technical cooperation with the developing countries in the study of propagation in tropical areas.

-- Resolution CZ, Relating to international cooperation and technical assistance in the field of space radiocommunications.

-- Recommendation ZN, Relating to the standardization of the technical and operational characteristics of radio equipment.

-- Recommendation YI, Relating to the means of reducing the congestion in band 7 (3 - 30 MHz).

4. Development of Telecommunications:

-- Resolution CE, Relating to technical cooperation with the developing countries in maritime telecommunications.

-- Resolution CX, Relating to the role of telecommunications in integrated rural development.

5. Preparation of Equipment Specifications:

-- Recommendation ZP, Relating to specifications of low cost television receivers.

6. Technology Transfer to Improve Services of All Kinds:

-- Resolution BG, Relating to the transfer of technology.

C. The U.S. actively supported some of the resolutions and recommendations, and joined in the consensus adoption of the others. It is clear that cooperation and assistance which yields an increased knowledge and improved understanding of technology, operation, and frequency management will result in more efficient and orderly use of the radio frequency spectrum, to the benefit of all ITU Members. The main concern of the Delegation was to ensure wording in the resolutions and recommendations consistent with our policy that funding be provided by the U.N. Development Program and other voluntary sources, and that the ITU not become directly involved in technical assistance. This objective was generally achieved.

D. Based on discussions during WARC, it is fully expected that the subject of technical cooperation and assistance will become increasingly important to the majority of ITU Members. Therefore it will be a major issue at the upcoming administrative radio conferences, the annual Administrative Council sessions, and the Plenipotentiary Conference scheduled for October 1982. This is an area where the U.S., including private industry, can take the initiative to develop appropriate and cost-effective programs — unilaterally or in conjunction with the ITU, UNDP or other organizations — that will improve our image and working relationship with developing countries at future ITU conferences.

XII. FINAL PROTOCOL

A. A total of fifty-one statements for the Final Protocol involving eighty-one countries were submitted during the period allowed for filing reservations on the decisions taken by the 1979 WARC. In addition, thirty-two counter-reservations involving sixty-three countries were submitted in the following twenty-four hour period. All eighty-three statements for the Final Protocol were noted in Plenary without discussion, with the single exception of No. 79 regarding the claim of equatorial countries to sovereignty over the geostationary orbit above their territory, which is discussed below.

B. The U.S. submitted reservations on a small number of Conference decisions where it was felt that the decisions taken could adversely affect an important national communications requirement. These reservations are as follows:

1. The major reservation (Protocol No. 38) involved changes to the Table of Frequency Allocations and reads as follows:

> "The delegation of the United States of America formally declares that the United States of America does not, by signature of these Final Acts on its behalf, accept certain decisions taken by this Conference in regard to the Table of Frequency Allocations and the associated footnotes, and therefore, the United States of America:
>
> "1. In view of the fact that this Conference has failed to provide adequate allocations for the HF broadcasting service, particularly at 6 and 7 MHz, reserves on this matter as indicated in a separate statement made jointly with the delegations of Saudi Arabia, Cyprus, Spain, Greece, the United Kingdom, Sri Lanka and Zambia;
>
> "2. Reserves the right to operate stations in the mobile satellite service in the frequency range 235 to 399.9 MHz as indicated in a separate statement made jointly with the delegations of the Federal Republic of Germany, Belgium, Denmark, Greece, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom and Turkey;
>
> "3. In the operation of stations in the radiolocation service on a primary basis in the bands 430 - 440 MHz, 5 650 - 5 850 MHz, 8 500 - 8 750 MHz, 8 850 - 9 000 MHz, 9 200 - 9 300 MHz, 9 500 - 9 800 MHz, 10 000 - 10 500 MHz, 13.4 - 14 GHz, 15.7 - 17.3 GHz and 33.4 - 36 GHz, cannot guarantee protection to or coordination with other services;

"4. Reserves the right to operate stations of the fixed, mobile and radiolocation services on a primary basis in bands as specified in the footnotes pertinent to frequency bands 470 - 806 MHz and 890 - 960 MHz, without the condition specified in these footnotes that make such operations subject to agreement under Article N13A. The United States will coordinate its usage of such services with neighbouring administrations which are affected;

"5. In view of the fact that the Conference failed to provide adequate allocations for the HF maritime mobile service, particularly below 12 MHz, states its intention to satisfy maritime mobile requirements in the several HF bands below 10 MHz allocated to the mobile service on a primary basis."

2. The joint statement regarding HF broadcasting (Protocol No. 36), referred to in sub-paragraph 1 of No. 38 above, is as follows:

"In the view of the above-mentioned administrations /Saudi Arabia, Cyprus, Spain, the United States, Greece, the United Kingdom, Sri Lanka and Zambia/ this conference has failed to make adequate provision for the needs of the HF broadcasting service in the revised allocations, particularly at 6 and 7 MHz. Unless authority is given to the proposed HF Broadcasting Conference, by its agenda, for it to make use of some parts of the spectrum allocated to the fixed service, that Conference will not be able to plan all frequency bands to enable countries to sustain their broadcasting services in the face of varying propagation conditions throughout the solar cycle. In the absence of an adequate plan, the above-mentioned administrations reserve their right to take the necessary steps to meet the needs of their HF broadcasting services."

3. The joint statement by NATO countries regarding the operation of mobile satellite systems in the band 235-399.9 MHz (Protocol No. 32), referred to in sub-paragraph 2 of No. 38 above, is as follows:

"The above-mentioned administrations /Federal Republic of Germany, Belgium, Denmark, the United States, Greece, Iceland, Italy, Luxembourg, Norway, the Netherlands, Portugal, the United Kingdom and Turkey/ reserve their right to operate systems in the mobile satellite service in the frequency range 235-399.9 MHz under the provisions of the relevant footnote to the Table of Frequency Allocations, subject only to coordination as prescribed in Article N13A. The additional provision of this footnote imposes a condition of non-interference which could lead to a request to cease

> operation of a previously coordinated satellite system in the case where an administration, despite having agreed to such a satellite system, puts into service or merely plans a system that might receive harmful interference. Such a condition is unacceptable to the above administrations."

C. The U.S. Delegation, upon instructions from the Department of State, also submitted a statement (Protocol No. 39) for the record regarding intentional jamming of some of our international broadcasts in the high frequency bands. It is noteworthy that this subject did not arise at any time in discussions during the Conference, although Israel made a reference to jamming in their statement for the Final Protocol. The U.S. reservation is as follows:

> "The administration of the United States of America, calling attention to the fact that some of its broadcasting in the high frequency bands allocated to the broadcasting service are subject to willful harmful interference by administrations that are signatory to these Final Acts, and that such interference is incompatible with the rational and equitable use of these bands, declares that for as long as this interference exists, it reserves the right with respect to such interference to take necessary and appropriate actions to protect its broadcasting interests. In so doing, however, it intends to respect the rights, to the extent practicable, of administrations operating in accordance with these Final Acts."

D. Colombia and seven other equatorial countries submitted an initial statement (Protocol No. 40) regarding their sovereignty claim to the geostationary orbit above their territory. Indonesia submitted a separate statement (Protocol No. 42) on the same subject. The U.S. in close coordination with several other countries developed a counter-statement consistent with our policy in the U.N. Outer Space Committee, and submitted it jointly with twenty-two other countries in reply to the two statements mentioned above. However, Colombia, et al, submitted a further statement (Protocol No. 79) that implied recognition of the equatorial countries' claim in Resolution BP relating to the Space WARC. The U.S. and others objected to the Colombian action in Plenary and sought to have it rejected since it was not a counter-statement to any submitted earlier. The issue was finally resolved by revising the twenty-three country joint statement to counter the latest Colombian move. The final counter-statement (Protocol No. 75) submitted by the U.S. and others is as follows:

> "The above-mentioned delegations /Federal Republic of Germany, Australia, Austria, Belgium, Canada, Denmark, the United States, Finland, France, Greece, Ireland, Italy, Japan, Liechtenstein, Luxembourg, Norway, New Zealand,

> Papua New Guinea, the Netherlands, Portugal, the United Kingdom, Sweden and Switzerland7, referring to the reservations made by the Republic of Colombia, the People's Republic of the Congo, the Republic of Ecuador, the Gabon Republic, the Republic of Kenya, the Republic of Uganda, the Somali Democratic Republic and the Republic of Zaire in statement No. 40 and by the Republic of Indonesia in statement No. 42, consider that, in as much as these statements refer to the Bogota Declaration of 3 December 1976 by equatorial countries and to the claims of those countries to exercise sovereign rights over segments of the geostationary-satellite orbit, the claims in question cannot be recognized by this Conference, and that the decisions of this Conference regarding the assignment and use of frequencies and orbital positions in the geostationary orbit are fully in accordance with the International Telecommunication Convention (Malaga-Torremolinos, 1973) by which this Conference is bound.
>
> "The above-mentioned delegations also wish to state that Resolution BP, in referring to the 'relevant technical aspects concerning the special geographical situation of particular countries', does not imply a recognition of claims to any preferential rights to the geostationary orbit."

E. Cuba submitted a statement for Final Protocol (No. 9) directed against the United States, as follows:

> "Signature and acceptance of the Final Acts of the World Administrative Radio Conference, Geneva, 1979, by the Government of the Republic of Cuba does not in any way signify recognition of notification, registration and use of frequencies by the Government of the United States of America in the Cuban territory of the Province of Guantanamo which is being occupied illegally and against the wishes of the Cuban people.
>
> "The use of radio frequencies by the Government of the United States in the territory which it has usurped in Guantanamo, Cuba, constitutes an impediment to the communication services of Cuba and to the exercise of our country's sovereignty over the radio frequency spectrum, which is a limited resource.
>
> "The Government of Cuba reserves the right to take all the necessary steps to safeguard its legitimate interests."

The United States countered with the following short statement (Protocol No. 72):

> "With reference to statement No. 9 by the Government of the Republic of Cuba, the Government of the United States of America notes that the United States presence in Guantanamo is by virtue of a treaty in force; the United States reserves the right to meet its radiocommunication requirements there as heretofore."

F. The remaining initial statements covered a wide variety of issues; however, the largest category (twenty-two) contained a general statement that the administration(s) would do whatever is necessary to protect its interests. Other reservations of particular interest are as follows:

1. Insufficient increase in allocations to HF Broadcasting Service — in addition to the seven countries in the joint statement with the U.S., fourteen other administrations took a reservation on this matter. Several extended their dissatisfaction to include the maritime HF allocations;

2. Intention to continue HF Fixed Service in the bands reallocated to broadcasting and maritime -- ten countries submitted a statement along this line, all but one of which are in Latin America or the Soviet Union bloc;

3. Canada — took a separate reservation on the use of mobile satellite under Footnote 308A in the band 235-399.9 MHz and on the insufficient increase for HF broadcasting at 7 MHz; and finally,

4. Air-ground public telephone service -- ten European countries reserved their right to use channels in the band 862-960 MHz for this operation.

G. Counter-reservations were almost entirely of the general type, stating that in view of the reservations filed, the administration would take whatever steps are necessary to protect its interests. However, three countries mentioned the U.S. reservations specifically in their counter-statement. Kenya took exception to our Nos. 32, 36 and 38, Iran to Nos. 32 and 38, and Cuba to Nos. 36 and 38.

XIII. FORM OF RESULTS AND ENTRY INTO FORCE

A. The Final Acts adopted by the 1979 WARC constitute the "Radio Regulations, Geneva, 1979", which completely replace the provisions of the Radio Regulations, Geneva, 1959, as partially revised by the Administrative Radio Conferences held in 1963, 1966, 1967, 1971, 1974 and 1978. The provisions and associated plan adopted by the 1977 WARC for the Planning of the Broadcast Satellite Service in the 12 GHz Band are included in an appropriate manner and without affecting their content and integrity, and form an integral part of the 1979 Radio Regulations. The Conference authorized the Secretary General to make the necessary final numbering of chapters, articles, sections, sub-sections, paragraphs, sub-paragraphs and marginal numbering, the final numbering of the Appendices, and the consequential cross-references thereto, with regard to the 1979 Radio Regulations, of which certified true copies should be sent by him to the Members of the Union. Members are to inform the Secretary General of their approval (ratification); and the Secretary General will in turn promptly inform all other Members of the ITU.

B. The Final Acts were signed for the United States by Ambassador Glen O. Robinson, Chairman of the U.S. Delegation, and Mr. Samuel E. Probst, a Vice Chairman of the Delegation. It should be noted that the Additional Radio Regulations which form a separate annex to the Convention will be abrogated. The U.S. has never ratified these administrative Regulations or signed earlier Final Acts relevant to them due to a conflict with domestic law and regulations.

C. The 1979 Radio Regulations shall, in general, enter into force on January 1, 1982 at which time all provisions of the 1959 Radio Regulations, as revised, are abrogated, except as noted below. There are two main elements of the Final Acts which have an earlier date of entry into force, that is, January 1, 1981. These are as follows:

1. Provisions relating to identification of stations - Article N23 and new Appendix CA, at which time old Article 19, except for Nos. 745-747 and the associated appendix, shall be abrogated; and

2. Provisions relating to maritime accounting - Article N62A, at which time Articles 37, 38, 39, 40, and 40A and Appendices 21, 21A and 22 and the Additional Radio Regulations shall be abrogated.

D. One part of the Final Acts has a later date of entry into force, that is, February 1, 1983. This is Appendix 27 containing the Frequency Allotment Plan for the Aeronautical Mobile (R) Service and the directly related provisions. This date of entry into force was adopted by the 1978 Aeronautical WARC and respected by the 1979 Conference. The new Regulations contain a wide variety of other dates applicable to specific provisions, implementation steps, and other required actions. An example of one of the more significant dates is the changeover to the new allocations in the high frequency band, i.e., 1989 for bands above 10 MHz and 1994 for bands below 10 MHz.

XIV. CONCLUSIONS

The Conference was eleven weeks of strenuous work, probably too long in view of the extended absences of key telecommunications officials from their jobs. It was an intensive period of difficult negotiations. Yet it was hardly long enough in view of the large number of proposals that had to be considered and the critical issues to be decided, many of which were extremely complex due to the technical, economic, operational, social and political aspects involved. Before the end of the Conference, nearly 17,000 individual proposals had been handled and more than 900 meetings had been held. It was also a difficult Conference just because of its size, the wide variations in background and experience of the delegates, and the many direct conflicts in basic requirements and objectives of the participating administrations. In spite of all this it was the unanimous conclusion of the delegations and the ITU officials at the end of the Conference that the 1979 WARC was a success. The Secretary General in his closing remarks to the Conference went so far as to describe it as "a brilliant success". Understanding and cooperation leading to consensus and agreement — the traditional ITU working method — resulted in the adoption of new Radio Regulations which will govern the various radio services in the use of the frequency spectrum until at least the end of the century.

The U.S. Delegation fully shares in the view that the WARC was successful in carrying out its objectives. We were impressed by the general absence of political debate and the ultimate satisfactory resolution of most of the technical issues. Despite concerns we may have about a few particular decisions taken by the Conference, we believe that the modified Regulations and Allocation Table will provide a sound technical and regulatory framework for the expansion of communication facilities in the U.S. and abroad in the coming years while maintaining a significant degree of order in use of the spectrum allocations by the many radio services.

The U.S. submitted over 900 proposals, each one important, in varying degrees, to some national, social, economic and/or national security need. Almost all of the specific U.S. objectives were obtained, either in whole or in substantial part. Our four general objectives — to achieve international agreement, to maintain maximum flexibility, to support incremental changes, and to support the role of the ITU (see page 9 of this report) -- were achieved, at least for the immediate future. There will be no immediate or drastic changes in the structure and operation of the U.S. telecommunications system as a result of Conference decisions. In fact, many changes mandated by the Conference will be phased-in over an extended period of time.

In this regard, the Delegation found that the frequency allocations for defense purposes were more vulnerable than others, since military systems typically occupy wide bandwidths in highly desirable parts of the spectrum and they are less understood by developing countries. Defense interests were not seriously harmed by the WARC decisions but they were affected in a number of ways, including two that required the U.S. to submit reservations. Within the United States, satisfaction of future military requirements should be approached with a more flexible attitude with respect to compliance with the Radio Regulations, recognizing that this may entail additional economic and technological costs.

The United States submitted reservations on a small number of Conference decisions that could adversely affect an important national communications requirement. A reservation in this case is a formal statement that we will not be bound by a particular conference decision. However, too much should not be made of these reservations. It will be some time yet before the United States must decide if it will be necessary to follow-through with the various reservations. Although the U.S. previously had taken only one reservation at a WARC, this was an unusual record we could not hope to have maintained. What is noteworthy is that of the hundreds of particular decisions, many of them very significant, only a small handful were unacceptable to us.

A major U.S. objective -- support of the International Telecommunication Union as the international agency capable of providing a useful forum for discussing global telecommunications needs and problems and of carrying out the complex decisions of the Conference -- was fully achieved. Conference decisions affirmed (on a consensus basis in most instances) the importance of close cooperation in this important area of international relations, working through the ITU mechanism. We have reason to be well satisfied with the way in which Conference business was conducted. Although there was initial apprehension about politicization of the Conference -- and there were a few unfortunate political skirmishes -- we think the effectiveness of the ITU as a U.N. Specialized Agency devoted to constructive international cooperation has not been compromised. Indeed, the U.S. has every reason to regard the ITU as an effective body for reaching essential international agreement on the regulation of the radio spectrum.

It is a pleasure to note that the 1979 WARC was not the political forum filled with North-South confrontation that some observers predicted it would be. Technical, economic and operational bases predominated the negotiations with few exceptions. Major ideological debate on such issues as the New World Information Order did not occur. However, while the ITU and the international regulatory scheme came out of the 1979 WARC in good shape, it will be tested again in a series of specialized administrative radio conferences and the upcoming Plenipotentiary Conference. It is still a possibility that the ITU will receive undesirable spillover from other more political forums. There will still be underlying political and economic tensions between developed and developing countries, particularly in the areas of future rights to the frequency spectrum and geostationary orbit and of technical cooperation and assistance. A risk will exist for an impasse in negotiations, and it is possible that some conferences may adjourn without consensus and agreement or that blocs of administrations will refuse to go along with the majority on important issues. It is a fair conclusion that the effectiveness of the ITU and its international Regulations will be threatened again in the upcoming years. It is essential that the objective of all countries, and in particular, the United States, must be international cooperation and agreement arrived at through reasonable compromise by both the developed and developing countries, taking into account the real requirements of all interests involved.

The success of the U.S. in achieving its objectives was due in large part to the substantial preparatory effort carried out in the several years prior to the WARC. Major contributing factors were the well thought out and technically sound proposals that the U.S. submitted to the WARC and the extensive program of international consultations. While there may not be another General WARC or other conference of this magnitude before the end of the century, the several conferences scheduled for the near future will treat issues of vital interest to the United States. One might even view the 1979 WARC and the program of future conferences as one continuous ITU conference, with the former simply being the first session. It can be expected that many of the issues and concerns discussed in 1979 will touch each of the future events. The national and individual experience developed for and strengthened at the 1979 WARC should be fully utilized in the preparations for and negotiations at the upcoming conferences. It is imperative that sufficient resources -- both personnel and budgetary -- be made available to enable the U.S. to continue its successful and leading effort in this very important area of international cooperation and regulation.

The U.S. Delegation believes that the 1979 Radio Regulations should be ratified, notwithstanding the reservations taken in Geneva. In this regard, it may be advantageous to the U.S. to complete the ratification process well ahead of the date of entry into force (January 1, 1982). An early notification to the ITU of our approval may serve as a signal to all countries of our goodwill and determination to abide by the international obligations undertaken during the 1979 Conference.

This Report would not be complete without my expression of personal appreciation to each member of our Delegation and staff for his and her contribution to our team effort. Individually and as a group they displayed a high degree of excellence and competence in carrying out their assigned tasks. The successes were achieved and the difficulties were minimized through their persistence and expertise. The U.S. team performed with the highest distinction;

it was a privilege to have been associated with it. As Chairman I am grateful for the opportunity given me to participate in this Conference. I also appreciate the Department's strong support which was an essential contribution to the success achieved by the U.S. Delegation.

Respectfully yours,

Glen O. Robinson
Chairman
United States Delegation
World Administrative Radio Conference
Geneva, 1979

Annexes:

A - List of Countries and Organizations.

B - United States Delegation; Geneva Support Group; Department of State Public Advisory Committee.

C - List of Working and Ad Hoc Groups.

D - Cross-Reference List of Interim and Final Numbers Used for Major Elements of the Radio Regulations.

Annex A-1

List of Countries and Organizations

I. · Countries

Countries	Country Symbol	No. of delegates
Afghanistan (Democratic Republic of)	AFG	3
Albania (Socialist People's Republic of)	ALB	4
Algeria (Algerian Democratic and Popular Republic)	ALG	20
Germany (Federal Republic of)	D	51
Angola (People's Republic of)	AGL	6
Saudi Arabia (Kingdom of)	ARS	25
Argentine Republic	ARG	29
Australia	AUS	25
Austria	AUT	11
Bangladesh (People's Republic of)	BGD	10
Belgium	BEL	18
Benin (People's Republic of)	BEN	8
Byelorussian Soviet Socialist Republic	BLR	2
Bolivia (Republic of)	BOL	3
Botswana (Republic of)	BOT	2
Brazil (Federative Republic of)	B	23
Bulgaria (People's Republic of)	BUL	10
Burundi (Republic of)	BDI	4
Cameroon (United Republic of)	CME	7
Canada	CAN	38
Cape Verde (Republic of)	CPV	3
Central African Republic	CAF	3
Chile	CHL	10
China (People's Republic of)	CHN	28
Cyprus (Republic of)	CYP	8
Vatican City State	CVA	4
Colombia (Republic of)	CLM	21
Congo (People's Republic of the)	COG	5
Korea (Republic of)	KOR	24
Costa Rica	CTR	11
Ivory Coast (Republic of the)	CTI	13
Cuba	CUB	10
Denmark	DNK	18
Djibouti (Republic of)	DJI	3
Dominican Republic	DOM	2
Egypt (Arab Republic of)	EGY	15
El Salvador (Republic of)	SLV	6
United Arab Emirates	UAE	4
Ecuador	EQA	8
Spain	E	34
United States of America	USA	69
Ethiopia	ETH	5
Fiji	FJI	4
Finland	FNL	10

France	F	87
Gabon Republic	GAB	10
Gambia (Republic of the)	GMB	1
Ghana	GHA	2
Greece	GRC	16
Guatemala	GTM	6
Guinea (People's Revolutionary Republic of)	GUI	6
Guinea-Bissau (Republic of)	GNP	2
Guyana	GUB	3
Haiti (Republic of)	HTI	4
Upper Volta (Republic of)	HVO	3
Honduras (Republic of)	HND	4
Hungarian People's Republic	HNG	16
India (Republic of)	IND	15
Indonesia (Republic of)	INS	23
Iran (Islamic Republic of)	IRN	22
Iraq (Republic of)	IRQ	21
Ireland	IRL	9
Iceland	ISL	4
Israel (State of)	ISR	5
Italy	I	43
Jamaica	JMC	5
Japan	J	49
Jordan (Hashemite Kingdom of)	JOR	11
Democratic Kampuchea	CBG	1
Kenya (Republic of)	KEN	16
Kuwait (State of)	KWT	16
Lesotho (Kingdom of)	LSO	4
Lebanon	LBN	7
Liberia (Republic of)	LBR	11
Libya (Socialist People's Libyan Arab Jamahiriya)	LBY	5
Liechtenstein (Principality of)	LIE	2
Luxembourg	LUX	6
Madagascar (Democratic Republic of)	MDG	6
Malaysia	MLA	14
Malawi	MWI	6
Maldives (Republic of)	MLD	3
Mali (Republic of)	MLI	7
Malta (Republic of)	MLT	7
Morocco (Kingdom of)	MRC	14
Mauritius	MAU	1
Mauritania (Islamic Republic of)	MTN	1
Mexico	MEX	17
Monaco	MCO	3
Mongolian People's Republic	MNG	3
Mozambique (People's Republic of)	MOZ	2
Nauru (Republic of)	NRU	1
Nepal	NPL	2

Nicaragua	NCG	1
Niger (Republic of the)	NGR	3
Nigeria (Federal Republic of)	NIG	25
Norway	NOR	20
New Zealand	NZL	13
Oman (Sultanate of)	OMA	9
Uganda (Republic of)	UGA	3
Pakistan (Islamic Republic of)	PAK	4
Panama (Republic of)	PNR	4
Papua New Guinea	PNG	9
Paraguay (Republic of)	PRG	3
Netherlands (Kingdom of the)	HOL	31
Peru	PRU	5
Philippines (Republic of the)	PHL	14
Poland (People's Republic of)	POL	20
Portugal	POR	14
Qatar (State of)	QAT	16
Syrian Arab Republic	SYR	12
German Democratic Republic	DDR	14
Democratic People's Republic of Korea	KRE	12
Ukrainian Soviet Socialist Republic	UKR	2
Roumania (Socialist Republic of)	ROU	7
United Kingdom of Great Britain and Northern Ireland	G	48
Rwanda (Republic of)	RRW	3
San Marino (Republic of)	SMR	6
Senegal (Republic of the)	SEN	10
Sierra Leone	SRL	4
Singapore (Republic of)	SNG	5
Somali Democratic Republic	SOM	7
Sudan (Democratic Republic of the)	SDN	5
Sri Lanka (Democratic Socialist Republic of)	CLN	3
Sweden	S	26
Switzerland (Confederation of)	SUI	16
Swaziland (Kingdom of)	SWZ	2
Tanzania (United Republic of)	TGK	4
Chad (Republic of the)	TCD	2
Czechoslovak Socialist Republic	TCH	6
Thailand	THA	10
Togolese Republic	TGO	8
Trinidad and Tobago	TRD	1
Tunisia	TUN	23
Turkey	TUR	10
Union of Soviet Socialist Republics	URS	33
Uruguay (Oriental Republic of)	URG	12
Venezuela (Republic of)	VEN	21
Yemen Arab Republic	YEM	4
Yemen (People's Democratic Republic of)	YMS	2
Yugoslavia (Socialist Federal Republic of)	YUG	28
Zaire (Republic of)	ZAI	6
Zambia (Republic of	ZMB	4

II. Recognized Private Operating Agencies

The Marconi International Marine Company Ltd.

III. United Nations and Specialized Agencies

United Nations
United Nations Educational, Scientific and Cultural Organization (UNESCO)
World Health Organization (WHO)
International Civil Aviation Organization (ICAO)
World Meteorological Organization (WMO)
Intergovernmental Maritime Consultative Organization (IMCO)

IV. Regional Organizations (Art. 32 of Convention)

African Postal and Telecommunications Union (APTU)
Arab Telecommunication Union (ATU)
Pan-African Telecommunication Union (PATU)

V. Other International Organizations

Agency for Safety of Air Navigation in Africa and Madagascar (ASECNA)
European Space Agency (ESA)
North American National Broadcasters Association (NANBA)
International Air Transport Association (IATA)
Inter-American Association of Broadcasters (IAAB)
International Association of Lighthouse Authorities (IALA)
World Association for Christian Communication (WACC)
Intergovernmental Bureau for Informatics (IBI)
International Chamber of Shipping (ICS)
International Committee of the Red Cross (ICRC)
International Maritime Radio Association (CIRM)
International Special Committee on Radio Interference (CISPR)
Inter-Union Commission on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)
International Electrotechnical Commission (IEC)
International Transport Workers Federation (ITF)
Arab Satellite Communications Organization (ARABSAT)
International Criminal Police Organization (INTERPOL)
International Radio and Television Organization (OIRT)
International Telecommunications Satellite Organization (INTELSAT)
International Space Telecommunication Organization (INTERSPUTNIK)
Asia-Pacific Broadcasting Union (ABU)
Arab States Broadcasting Union (ASBU)
Union of National Radio and Television Organizations of Africa (URTNA)
European Broadcasting Union (EBU)
International Amateur Radio Union (IARU)
International Union of Radio Science (URSI)

VI. Permanent Organs of the Union

General Secretariat
International Frequency Registration Board (IFRB)
International Radio Consultative Committee (CCIR)
International Telegraph and Telephone Consultative Committee (CCITT)

Annex B-1

United States Delegation
to the
World Administrative Radio Conference
(Geneva, September 24 - December 6, 1979)

I. United States Delegation (see Note)

Chairman: Ambassador Glen O. Robinson

Vice Chairmen:

Mr. Wilson Dizard
Office of International Communications Policy
Department of State

Mr. Samuel E. Probst
Deputy Associate Administrator, Spectrum Management
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Mr. Francis S. Urbany
Manager, International Communications
National Telecommunications and Information Administration
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Note: An asterisk (*) indicates delegate who attended the Conference on a part-time basis. Ambassador William vanden Heuvel, U.S. Mission to the European Office of the United Nations and Other International Organizations, Geneva, was accredited in advance as a Senior Adviser but was unable to attend the Conference due to reassignment; therefore, his name does not appear in the final List of Participants of the 1979 WARC or in this Annex.

Congressional Advisers:

*The Honorable Wyche Fowler, Jr.
House of Representatives

*The Honorable Charles Rose
House of Representatives

Delegates:

Mr. Perry G. Ackerman
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National Association of Broadcasters
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Mr. Herbert T. Blaker
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Rockwell International
Arlington, Virginia

Mr. William Borman
Director of Technical Programs
Motorola, Inc.
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Mr. Nolan Bowie
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Citizens Communication Center
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NOTE: The following two persons were invited to participate in the Advisory Committee but were unable to because of the press of other business: Ms. Florine Koole, Assistant Vice President, Communications Workers of America, Omaha, Nebraska, and Mr. Val Williams, President and General Manager, National Association of Business and Educational Radio, Inc., Washington, D. C.

Annex C-1

List of Working and Ad Hoc Groups

Group	Terms of Reference (Chairman and U.S. Spokesman)
	Committee 1 - none
	Committee 2
2A	To examine credentials of various administrations (Chairman: Martinez (VEN); U.S. - none)
	Committee 3 - none
	Committee 4
4/ad hoc 1	To develop forms for the expression of peak envelope power, mean power and carrier power (Chairman: Mayher (USA); U.S. - none)
4A	Consideration of proposals relating to Article N1 (Sections V and VI) and Article N2 (Chairman: Bastikar (CAN); U.S. - Mayher)
4A1	To perform drafting with regard to definitions for satellites (Chairman: West (G); U.S. - Tycz)
4A2	To resolve definitions of "emission" and "radiation" (Chairman: Davies (AUS); U.S. - Parlow)
4A3	To resolve definitions required for "out-of-band emission", "out-of-band spectrum" and "spurious emission" (Chairman: Mayher (USA); U.S. - Tycz)
4A4	To determine technically correct definitions of "harmful interference", "permissible interference", "accepted interference" and "tolerable interference" (Chairman: Railton (PNG); U.S. - Parlow)
4A5	To consider definition of "protection ratio" (Chairman: Dwyer (AUS); U.S. - Mayher)
4A6	To define "channel", "frequency band", and, if necessary, interpret the meaning of "in the same band" from Doc. 279 (Chairman: Tycz (USA); U.S. - none)
4A7	To consider the table of frequency designators (LF, MF, etc.) Chairman: unknown; U.S. - Mayher)

4A8	To consider power terms: power, peak envelope power of a radio transmitter, mean power of a radio transmitter, carrier power of a radio transmitter (Chairman: Aka (CTI); U.S. - Tycz)
4A9	To consolidate all antenna gain definitions into one group (Chairman: Dwyer (AUS); U.S. - Mayher)
4A10	To consider definitions of coverage area and service area (Chairman: Groschel (D); U.S. - Breig)
4A11	To consider mobile earth station coordination distance, contours (Chairman: Railton (PNG); U.S. - Phillips)
4B	Consideration of proposals relating to sharing criteria between Space Systems and between Space and Terrestrial Systems: Articles N25, 26, 27 and 27A. Appendices 28, 28A, 28B, 29. Appendices 1A and 1B in connection with Committee 6 (Chairman: Craig (AUS); U.S. - Weiss)
4B1	Drafting group to deal with AUS and URS proposals on RR 6003 and RR 6004 (Chairman: Amero (CAN); U.S. - Weppler)
4B2	Consideration of: Format of Appendix 28, SPM Output, Relevant CCIR Reports, Proposals by administrations, Comments by the IFRB, and Comments made in 4B on October 4 (Chairman: Weiss (USA); U.S. - Lepkowski)
4B3	Consideration of Appendix 29 excluding discussion of Δt/t percentages in excess of 3% and discrimination TV/SCPC issue can be discussed (Chairman: Payet (F); U.S. - Weiss)
4B4	To consider sharing between ISS and Radionav and to establish pfd's on ISS in the range 20-40 GHz (Chairman: Bolingbroke (G); U.S. - Weiss)
4B5	Drafting group to deal with RR 6108, 6109, 6110 (Station keeping of space stations) (Chairman: Amero (CAN); U.S. - Greenquist)
4B6	Drafting group to deal with RR provisions for Radio Astronomy observations in the shielded zone of the Moon (Chairman: Dubinski (URS); U.S. - Pankonin)
4B7	To consider technical aspects of F/82/816 - F/82/821 re proposed Article N27A (BcSat uplinks) (Chairman: Willenberg (D); U.S. - Breig)

4B8	To consider the wording in Appendix 29 concerning assigned frequency bands and overlapping bands (Chairman: Brooks (IFRB); U.S. - Weiss)
4C	Consideration of proposals relating to Technical Provisions: Articles N3, 4, 16, 17, 33 (section IV B) and Appendices 3, 4, 5, A and B (Chairman: George (D); U.S. - Luther)
4C1	To consider proposals concerning Article N4, RR3244 relating to Technical Characteristics (Chairman: Bedington (CAN); U.S. - Luther)
4C2	To consider ALG/119/42, SLV/26/87 and DL-24 relating to RR 5001, Interference (Chairman: Visin (I); U.S. - Luther)
4C3	Drafting group to prepare consolidated language with terms of reference of bandwidth description, a consolidated Appendix B and Appendix 5, not to include additional characteristics, footnote referring to additional or up-to-date examples in CCIR texts (Chairman: Deveraux (G); U.S. - Luther)
4C4	To consolidate App. 5 and App. B and to develop a final list of necessary bandwidth examples, to include the additional characteristics of CCIR Rec. 507 for designation of emissions (Chairman: Langer (D); U.S. - Luther)
4C5	To consider spurious limits above 1 GHz -- should they exist, and, if so, what should they be? (Chairman: Railton (PNG); U.S. - Luther)
4R	(Editorial) To perfect the form of the provisions of the Radio Regulations revised and approved by the Working Groups of the Committee, without altering the sense (Chairman: Domingues (E); U.S. - none)

Committee 5

5/ad hoc 1	Study of Regions (Chairman: Lediju (NIG); U.S. - none)
5/ad hoc 2	Study of the organization of Working Group 5B (Chairman: Harbi (ALG); U.S. - none)
5/ad hoc 3	ISM applications (Chairman: Berthod (F); U.S. - McKinney)
5/ad hoc 4	High frequency broadcasting (Chairman: Huet (F); U.S. - G. Jacobs)

5/ad hoc 5	Consideration of proposals relating to the terms "active sensor" and "passive sensor" (Chairman: Quintas (E); U.S. - Williams)
5/ad hoc 6	Earth exploration-satellite service (space-to-Earth) in the band 8,025 - 8,400 MHz; sharing between the inter-satellite service and the radionavigation service in the band 32 - 33 GHz (Chairman: Kimball (USA); U.S. - none)
5/ad hoc 7	Draft Resolution concerning tropospheric scatter (Chairman: Tapiador (E); U.S. - none)
5/ad hoc 8	Problems of frequency sharing in the 12 GHz region between the fixed-satellite and the broadcasting-satellite services (between Regions 1 and 2 and Regions 1 and 3 and possible solutions) (Chairman: Phillips (G); U.S. - Shrum)
5/ad hoc 9	Frequency sharing between active and passive service in 10.6 - 10.8 GHz and 18.6 - 18.8 GHz bands (Chairman: Cisee (SEN); U.S. - Kimball)
5/ad hoc 10	Choice of the frequency bands to be used by the feeder links for the broadcasting-satellite service (Chairman: Ahmed (SDN); U.S. - Torak)
5/ad hoc 11	Use of the 3.4 - 3.6 GHz and 4.5 - 4.8 GHz bands by the fixed-satellite service (space-to-Earth) for national and sub-regional coverage) (Chairman: Subaran (JMC); U.S. - Torak)
5A	Review and if necessary revise all provisions associated with the Table of Frequency Allocations (Articles N1, N5, N6, N8, N28 (Sec. I), N29, N33A, N47) (Chairman: Quintas Castans (E); U.S. - Glunt)
5A1	Standard texts of footnotes on radio astronomy (Chairman: Horner (G); U.S. - McKinney)
5A2	Aeronautical Mobile Service (Chairman: Mueller (D); U.S. - Williams)
5A3	Consideration of proposals submitted in relation to the terms assignment, allotment and allocation (Chairman: Bletterie (F); U.S. - Glunt)
5BA	Review and if necessary revise the Table of Frequency Allocations in the bands below 4,000 kHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Cook (VEN); U.S. - Feigleson)

5BA1	Allocations in bands 130 - 490 kHz in Region 1 (Chairman: Lundberg (S); U.S. - none)
5BA2	Resolution 500 kHz guardband (Chairman: Benchemam (ALG); U.S. - Holliman)
5BA3	Allocations in bands 525 - 2,000 kHz in Region 2 (Chairman: Fernandez (CUB); U.S. - Feigleson)
5BA4	Allocation of frequency band 1,800 - 2,000 kHz in Region 3 (Chairman: Zamanian (IRN); U.S. - Glunt)
5BA5	Designation of a frequency in the bands 415 - 490 kHz or 510 - 525 kHz for transmission of distress, urgency and safety information to ships (Chairman: Vedder (HOL); U.S. - Holliman)
5BA6	Guardband frequency 2,170 - 2,194 kHz (Chairman: Hewitt (CAN); U.S. - Holliman)
5BA7	Recommendation relating to the preparation of a broadcasting plan in the band 1,605 - 1,705 kHz in Region 2 (Chairman: Chau (CAN); U.S. - Palmer)
5BA8	Allocation of Radiolocation Service in the bands 3,200 - 3,700 kHz (Chairman: Laurent (F); U.S. - none)
5BA9	Frequency bands for natural disaster (Chairman: Kieffer (SUI); U.S. - Glunt)
5BA10	Provisions for the use of the bands 1,625 - 1,635 kHz, 1,800 - 1,810 kHz and 2,160 - 2,170 kHz in Region 1 by the radiolocation service (Chairman: Watson (MWI); U.S. - none)
5BA11	Amend draft Recommendation in Document No. 513 (see 5BA7) (Chairman: Davies (AUS); U.S. - none)
5BA12	Planning for the use of the bands between 435 - 526.5 kHz and 1,606.5 - 2,400 kHz by the maritime mobile service in Region 1 (Chairman: Erikson (S); U.S. - Palmer)
5BA13	Use of LF bands shared between the broadcasting service and the aeronautical radionavigation service (Chairman: Longman (CAN); U.S. - Palmer)
5BA14	Modification of carrier frequencies of LF broadcasting stations in Region 1 (Chairman: Huet (F); U.S. - none)

5BB	Review and if necessary revise the Table of Frequency Allocations in the bands between 4 and 27.5 MHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Barnes (AUS); U.S. - Feigleson)
5BA/5BB ad hoc	Analysis of Resolutions and Recommendations assigned to Working Groups 5BA and 5BB (ARG/PNG only)
5C	Review and if necessary revise the Table of Frequency Allocations in the bands between 27.5 MHz and 960 MHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Olms (D); U.S. - Gilsenan)
5C/ad hoc	Consideration of proposals concerning bands between 47 and 68 MHz (Region 1) and between 87.5 and 108 MHz (Regions 1 and 3) (Chairman: Schwarz (SUI); U.S. - van Doorn)
5D	Review and if necessary revise the Table of Frequency Allocations in the bands between 960 MHz and 40 GHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Rao (IND); U.S. - E. Jacobs)
5D1	Fixed-satellite service and broadcasting-satellite feeder links (Chairman: Withers (G); U.S. - Lepkowski)
5D2	Drafting of footnote MOD 3713/361 (D/F/SUI; U.S. - E. Jacobs)
5D3	Draft Resolution on study by the CCIR of choice of suitable frequency, effect on other radio services and on the ionosphere of the transmission of power by wireless (Proposal USA/45/145) (Chairman: Carter (G); U.S. - Kimball)
5D4	Combined proposals on footnote 3730/367B (Chairman: Holliman (USA); U.S. - none)
5D5	Preparation of possible footnotes applicable to allocations in the frequency band 960 MHZ - 40 GHz for radio astronomy service and ISM applications (Chairman: Whiteoak (AUS); U.S. - Pankonin)
5D6	Proposals relating to the bands between 1,535 and 1,660 MHz (Chairman: Dorian (USA); U.S. - E. Jacobs)
5D7	Satellite sound broadcasting in the band 960 MHz - 2 GHz (Chairman: Dito (HOL); U.S. - E. Jacobs)

5D8	Summarized proposal for fixed-satellite service (space-to-Earth) allocation in the bands 3.4 - 3.7 GHz and 4.5 - 4.8 GHz and footnotes and Resolution (Chairman: Ogle (USA); U.S. - Torak)
5D9	Summarized proposal for fixed-satellite service (Earth-to-space) allocation in the band 10 - 20 GHz (Chairman: Ahmed (SDN); U.S. - E. Jacobs)
5D10	Drafting of footnote ADD 3782A (Chairman: Holliman (USA); U.S. - none)
5D11	Earth exploration and space research services in the bands 10.6 - 10.7 GHz (Chairman: Doherty (CAN); U.S. - Kimball)
5D12	Summarized proposals of delegations of AUS and USA and proposals contained in Document No. DL/146 (Chairman: Roussin (F); U.S. - Dorian)
5D13	Summarized proposals relating to footnotes 3705/356AB, 3706/356ABA and 3707/356AC and drafting of modified texts (Chairman: Alambreros (E); U.S. - Kimball)
5D14	To formulate the text of a footnote which is applicable in the exclusive passive bands (Chairman: Greco (I); U.S. - E. Jacobs)
5D15	To formulate the text of a footnote in connection with the allocation of the band 12.2 - 12.5 GHz to the broadcasting-satellite service and fixed-satellite services in Region 3 (Chairman: Pike (AUS); U.S. - Reinhart)
5D16	Proposals concerning allocations in the 12 GHz band (Chairman: Pike (AUS); U.S. - Shrum)
Region 2 ad hoc	Preparation of texts relating to the allocation of the 11.7 - 12.7 GHz band in Region 2 as well as the relevant Resolutions (Chairman: Martinez (VEN); U.S. - Shrum)
5E	Review and if necessary revise the Table of Frequency Allocations in the bands above 40 GHz and consider any Resolutions and Recommendations concerning the use of frequencies in these bands (Chairman: Adey (CAN); U.S. - Moore)
5E1	Consideration of proposals concerning passive services at frequencies above 275 GHz (Chairman: Whiteoak (AUS); U.S. - Moore)

5E2 Consideration of allocations to space services in the bands 40 - 52 GHz and of recommendations to be made to Working Group 5B for bands 36 - 40 GHz (Chairman: Moore (USA); U.S. - May)

5E3 Consideration of proposals concerning allocations of frequencies in the band 52 - 84 GHz (Chairman: Olsen (CAN); U.S. - Moore)

5E4 Consideration of proposals relating to allocations of frequencies in the bands 84 - 105 GHz (Chairman: Schult (D); U.S. - Moore)

5E5 Consideration of proposals relating to allocations of frequencies in the bands 105 - 152 GHz (Chairman: Stemp (G); U.S. - Moore)

5E6 Consideration of proposals relating to allocations of frequencies between 152 - 230 GHz (Chairman: Muratani (J); U.S. - Moore)

5E7 Consideration of proposals relating to allocations of frequencies between 217 - 275 GHz (Chairman: Das (USA); U.S. - Moore)

5E8 Consideration of proposals relating to allocations in the bands above 275 GHz (Chairman: Bourgeat (F); U.S. - Moore)

5R (Editorial) To perfect the form of the texts to be considered by Committee 5 without altering the sense (Chairman: Piponnier (F); U.S. - none)

Committee 6

6/ad hoc 1 To consider the UK proposal in Doc. 358 regarding the application of CCIR Recommendations referred to in the Regulations (Chairman: Larsen (DNK); U.S. - Corrado)

6/ad hoc 2 To examine all proposals related to the use of the geostationary orbit and to the planning of space services utilizing it.

To give consideration to:

the desirability, feasibility and the possibility of planning of space services

the services and frequency bands which might be considered within the framework of this planning

the preparatory work that would have to be carried out before any planning conference, including development of the principles and necessary technical bases

the desirability, feasibility and possibility of other approaches supplemental to the existing provisions of Articles N11 and N13.

	To prepare, if necessary, the texts to be proposed for adoption by WARC 1979 (Chairman: Wilkinson (AUS); U.S. - Urbany)
6/ad hoc 3	To consider items concerning a transition procedure at HF and related Notification procedures (Chairman: Bjornsjo (S); U.S. - Corrado)
6/ad hoc 4	To consider a proposal of France relating to the procedure for the transfer of ICPO Interpol frequency assignments in MF bands; To consider a proposal of the USA relating to revision of Res. No. Spa2-6 (Chairman: Deodhar (IND); U.S. - Kelleher)
6A	To examine the proposals relating to the coordination, notification and registration of frequency assignments (Articles N11, N12, N13) and proposals relating to new procedures connected with these Articles; Appendices 1, 1A and 1B; the appropriate Resolutions (including Resolution No. Spa2-3) and Recommendations (Chairman: Bjornsjo (S); U.S. - Kelleher)
6A/ad hoc 1	To align Art. N12 with the principles in Doc. 488 concerning the HF fixed service and to examine appropriate Resolutions (Chairman: Bouhired (ALG); U.S. - Urbany)
6A/ad hoc 2	To develop a Resolution concerning assistance to the developing countries in frequency management (Chairman: Kaba (HVO); U.S. - Carroll)
6A1	Drafting group to develop wording of the Regulations relating to the work of 6A1 (Chairman: Bjornsjo (S); U.S. - Kelleher)
6A2	To consider existing Resolutions and Recommendations; to examine and develop Resolutions concerning assistance in the use of computers (Chairman: Lewis (AUS); U.S. - Kelleher)
6A3	To consider proposed changes to Appendices 1, 1A, 1B and 9 (Chairman: Corrado (USA); U.S. - Lepkowski)
6A4	To consider principles for regulatory procedures relative to the HF band and consequential amendments to Article N12/9 (Chairman: Bouhired (ALG); U.S. - Urbany)

6B	To examine the proposals relating to the activities of the IFRB (Articles N9 and N10); the provisions adopted against harmful interference in the N20 (Procedure in a case of Harmful Interference) and the corresponding Appendices 6, 7 and 8; the amendments to be made to Appendix 9 (List I) resulting from the decisions on Articles N11, N12 and N13 and Appendices 1, 1A and 1B; the Resolutions and Recommendations other than those relating to procedures connected with Articles N11, N12 and N13 (Chairman: Garcia de Davis (CTR); U.S. - Corrado)
6B1	To consider proposals for the Radio Regulations Nos. 3953, 3953A, 3960A and 3960A.1 (Chairman: Binz (D); U.S. - Corrado)
6B2	To consider proposals for the Appendices 6, 7 and 8 (Chairman: Corrado (USA); U.S. - none)
6R	(Editorial) To improve the drafting of the provisions of the Radio Regulations revised and approved by the Working Groups of Committee 6, without changing the sense (Chairman: Garidou (F); U.S. - none)

Committee 7

7/ad hoc 1	(not used)
7/ad hoc 2	To consider all proposals concerning Res. No. Sat 4 relating to the annexing to the Radio Regulations of the provisions and associated Plan contained in the Final Acts of the World Broadcasting-Satellite Administrative Radio Conference, Geneva, 1977 (Chairman: Utsumi (J); U.S. - Shrum)
7/ad hoc 3	To reach consensus on an Argentina proposal for a WARC Recommendation that the ITU Secretariat develop with Administrations a "draft" conference structure, including proposed committee structure, approximately one year ahead of an Administrative Radio Conference so that smaller countries, particularly developing countries, could plan delegation size and conference participation in the right proportion (Chairman: Otero (ARG); U.S. - none)
7/ad hoc 4	To consider the contents of Doc. No. 625, to which were annexed texts of proposed additional provisions in Articles N11, N12 and N13 relating to the responsibility for frequency notifications and to cases of disputed sovereignties, and Doc. No. DL/226 containing a proposal from Morocco for a preamble to the Radio Regulations on this subject (Chairman: Fulton (G); U.S. - Schaefer)

7/ad hoc 5	To develop a possible schedule for future Radio Conferences and to treat associated Resolutions (Chairman: Ducharme (CAN); U.S. - McKinney)
7/ad hoc 6	To consider proposals concerning Service Documents: Article N24/20, Appendices 9, 10, 10A and 11, Resolution No. Mar2-17 (Chairman: Schenke (D); U.S. - Luther)
7/ad hoc 7	To consider proposals for Article N23 (Identification of Stations) and associated appendices except new Appendic C (Chairman: Railton (PNG); U.S. - McKinney)
7/ad hoc 8	To review and, if necessary, revise a draft Recommendation concerning the optimization of the use of frequencies in parts of the VHF and UHF spectrum by introducing bandwidth-saving techniques for the transmission of television signals (Chairman: DeZwart (HOL); U.S. - Breig)
7A	To study the technical aspects for the use of radiocommunications for marking, identifying, locating and communicating with the means of medical transport protected under the 1949 Geneva Conventions and any additional instruments of these Conventions (Chairman: Foggon (AUS); U.S. - McKinney)
7A1	Drafting group concerning language for provisions for medical transports (Chairman: McKinney (USA); U.S. - none)
7B	Drafting group to consider Definitions in Section 1 of Article N1 (Chairman: Witham (G); U.S. - Williams)
7R	(Editorial) To improve the drafting of the provisions of the Radio Regulations revised and approved by Committee 7, without changing the sense (Chairman: Bisner (F); U.S. - none)

Committee 8

8/ad hoc 1	To consider proposals relating to the Re-arrangements of the Radio Regulations as they affect Chapters NXI and NXII (Chairman: Fulton (G); U.S. - Anderson)
8/ad hoc 2	To consider proposals relating to the Re-arrangements of the Radio Regulations as they affect Chapter NIXA (Priority of communications in the mobile services, public correspondence in the maritime mobile service) Chairman: Fulton (G); U.S. - Harrison)

Committee 9

9/ad hoc 1	To treat texts concerning Definitions (Article N1) (Chairman: Bletterie (F); U.S. - Aldrich)
9/ad hoc 2	To review miscellaneous Recommendations and Resolutions from Committee 4 (Chairman: various (F); U.S. - Aldrich)

Plenary

PL/ad hoc 1	To prepare Appendix 28 for Plenary consideration; to do calculations shown in Tables 1 and 2 based upon Plenary-approved Table of Frequency Allocations (Art. N7/5) (Chairman: Craig (AUS); U.S. - Parlow)
PL/ad hoc 2	To consider Doc. No. 576, a Syrian draft resolution relating to operations in HF broadcasting (Chairman: Chabsigh (SYR); U.S. - Luther)
PL/ad hoc 3	To review a draft recommendation relating to the standardization of the technical and operational characteristics of radio equipment (Chairman: Malumbe (KEN); U.S. - Breig)
PL/ad hoc 4	To consider the texts developed by various Committees regarding provisions concerning services in the bands allocated to the broadcasting-satellite service at 12 GHz (Article N13B and Resolutions Nos. BB, CC, DD, EE) (Chairman: Carter (G); U.S. - Shrum)

Annex D-1

Cross-Reference List of Interim and Final Numbers Used for Major Elements of the Radio Regulations

Articles of the Radio Regulations
(Chapter/Interim Article Number/Final Number)

Part A

I	N1	1		N23	25		N47	50
	N2	2	VII	N24	26		N48	51
	N2A	3	VIII	Part B N25	27		N49	52
	N3	4		N26	28		N50	53
II	N4	5		N27	29	XI	N51	54
III	N5	6		N28	30		N52	55
	N6	7		N29	31		N53	56
	N7	8		N30	32		N54	57
	N8	9		N31	33		N55	58
IV	N9	10		N32	34		N56	59
	N10	SUP		N33	35		N57	60
	N11	11		N33A	36		N58	61
	N12	12	IX	N34	37		N59	62
	N13	13		N35	38		N60	63
	N13A	14		N36	39		N61	64
	N13B	15		N37	40		N62	65
	N14	16		N38	41		N62A	66
	N15	17		N39	42		N63	SUP
V	N16	18	X	N40	43		N64	SUP
	N17	19		N41	44	XII	N65	67
	N18	20		N42	45		N66	SUP
	N19	21		N43	46		N67	SUP
	N20	22		N44	47		N68	68
VI	N21	23		N45	48		N69-N72 + ARR	SUP
	N22	24		N46	49	XIII	N73	69

Appendices

(Interim Number/Final Number)

1	1	17A	17
1A	3	18	18
1B	4	19	19
1C	5	19A	20
2	2	20	36
3	7	20A	37
4	8	20B	38
5	6	20C	39
6	21	20D	40
7	22	21	SUP
8	23	21A	SUP
9	9	22	SUP
10	10	23	41
11	11	24	SUP
12	12	25 MOD	SUP
13	13	25 Mar2	25
13A	14	26	26
14	15	27	27
15 Mar2	31	27 Aer2	27 Aer2
15	SUP	28	28
15A	32	29	29
15B	33	29A	30
15C	34	A	SUP
15D	35	B	SUP
16	24	C	42
17	SUP	CA	43
17 Rev.	16	CB	44

Resolutions

(WARC Identifier/Final Number)

AA	35
AB	201
AC	315
AD	7
AE	66
AF	10
AG	63
AH	65
AI	32
AJ	60
AK	36
AL	601
AM	62
AN	200
AO	305
AP	506
AQ	307
AR	314
AS	304
AT	309
AU	507
AV	303
AW	306
AX	302
AY	2
AZ	300
BA	301
BB	308
BC	503
BD	100
BE*	-
BF	407
BG	402
BH	400
BI	401
BJ	67
BK	61
BL	406
BM	510
BN	640
BO	33
BP	3
BQ	101
BR	38
BS	500
BT	404
BU	501
BV	642
BW	6
BX	37
BY	4
BZ	103
CA	1
CB	403
CC	405
CD	68
CE	316
CF	64
CG	5
CH	701
CI	31
CJ	700
CK	504
CL	34
CM	505
CN	310
CO	600
CP*	-
CQ	509
CR	641
CS	102
CT	9

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*Letters not used.

Resolutions (cont'd.)

CU	30
CV	8
CW	703
CX	16
CY	11
CZ	15
DA	312
DB	311
DC	12
DD	313
DE	13
DF	17
DG	14
DH	202
DI	508
DJ	502
DK	702

Recommendations

(WARC Identifier/Final Number)

A*	–
B	11
C	204
D	30
E	68
F	202
G*	–
H	500
I	501
J	73
K	62
L	66
M	63
N	710
O	709
P	69
Q	60
R	64
S	70
T	705
U	712
V	403
W*	–
X	102
Y	405
Z	711
ZA	103
ZB	61
ZC	506
ZD	508
ZE	101
ZF	507
ZG	9
ZH	603
ZI	2
ZJ	402
ZK	400
ZL	505
ZM	65
ZN	71
ZO	74
ZP	502
ZQ	708
ZR	72
ZS	503
ZT	620
ZU	703
ZV	704
ZW	305
ZX	404
ZY	310
ZZ	200
YA	203
YB	309
YC	504
YD	300
YE	301
YF	406
YG	31
YH	67
YI	5
YJ	4
YK	601
YL	307
YM	302
YN	401

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*Letter(s) not used.

Recommendations (cont'd.)

YO	308
YP	304
YQ	306
YR	313
YS	201
YT	312
YU	702
YV	707
YW	706
YX	100
YY	701
YZ	600
XA	605
XB	407
XC	700
XD	602
XE	1
XF	10
XG*	-
XH	6
XI	604
XJ	303
XK	7
XL	311
XM	12
XN	8
XO	3
XP	13

Radiofrequency Use and Management

Impacts From the World Administrative Radio Conference of 1979

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Washington, D.C. 20510

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Radiofrequency Use and Management

Impacts From the World Administrative Radio Conference of 1979

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Foreword

This study responds to a request from the Senate Committee on Commerce, Science, and Transportation to evaluate the impacts on the United States of key decisions taken at the general World Administrative Radio Conference (WARC-79) and to consider options for preparation and participation in future international telecommunication conferences. It reflects congressional concern for the adequacy of existing machinery and procedures for U.S. policymaking and preparation for such conferences.

WARC-79 and related international conferences and meetings demonstrate that contention for access to the radio spectrum and its important collateral element, the geostationary orbit for communication satellites, presents new and urgent challenges to vital U.S. national interests. The growing differences among nations over the use of the radio spectrum and related satellite orbit capacity are reflected in the Final Acts of WARC-79 which will be submitted to the U.S. Senate in January 1982, for advice and consent to ratification.

Given the complexities of spectrum management in a changing world environment and the increased importance of telecommunications to both developed and developing nations, it is unlikely that traditional U.S. approaches to these issues will be sufficient to protect vital U.S. interests in the future. Problems require strategies not yet developed or tested.

OTA acknowledges with thanks and appreciation the advice and counsel of the panel members, contractors, other agencies of Government, and individual participants who helped bring the study to completion.

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Chapter 1

Summary

Background of Study

The Final Acts of the General World Administrative Radio Conference (WARC-79) are to be submitted to the U.S. Senate for advice and consent to ratification. Issues vital to U.S. interests in continued efficient use of the radiofrequency spectrum—including satellites operating in geostationary orbit—were addressed at WARC-79 and will be addressed at future, more specific conferences of the International Telecommunication Union (ITU).

The Senate Committee on Commerce, Science, and Transportation requested that the Office of Technology Assessment (OTA) determine the impacts on the United States of decisions negotiated at the general World Administrative Radio Conference (WARC-79), and consider options for preparation and participation in future international telecommunication conferences. The request reflects congressional concern for the adequacy of existing machinery and procedures for U.S. telecommunication policymaking and preparation for international telecommunication conferences. It also reflects an awareness of the vital and growing role that telecommunication plays in our society and our dependence on the radiofrequency spectrum.

The purpose of this study was to examine WARC-79 in a comprehensive way—describing U.S. preparations and involvement, and the impact of the conference. However, no attempt was made to examine all issues and aspects of WARC-79, but rather to focus on certain important ones and analyze their consequences for the United States. The study considered alternative structures, procedures, and strategies to improve frequency spectrum planning and management to assure the United States of continued satisfaction of its commercial, Government, and national security requirements for frequency spectrum and geostationary satellite orbit locations.

WARC-79 was convened by ITU in an effort to reach global agreement on the revised international arrangements necessary for efficient and interference-free use of the radiofrequency spectrum. The Final Acts of the conference will constitute the "radio regulations, Geneva, 1979" and enter into force on January 1, 1982 for those countries that have formally adopted the Final Acts. The 1959 Radio Regulations, as partially revised by subsequent specialized administrative radio conferences, will be superseded. WARC-79 was of special importance because of the broad scope of its agenda, which included most of the major arrangements relating to radio, and because it was the first *general* administrative radio conference since 1959 and therefore included many developing countries that had won their independence in the intervening two decades.

The telecommunication systems of the United States are the most sophisticated, efficient, and all-encompassing in the world. These systems are a vital element of our economic strength and security; they are an essential part of our culture. Other nations, recognizing the key role that telecommunications play in national and international affairs, are constantly striving to gain access to telecommunication technology. Highly industrialized nations seek to surpass the United States in technological inventiveness and in the practical exploitation of the many telecommunication subsystems that make up a modern "information society."

As a leader in communication technology, the United States has been able to develop domestic telecommunication systems in large measure apart from the activities of other countries. At the international level, the United States has played a leading role in shaping an essentially benign and passive mechanism within ITU for allocating radio spectrum to certain specified purposes, and assuring spectrum users the right to operate free from harmful interference by others.

This international regime, which has succeeded in avoiding chaos in the use of radiofrequencies, is coming under considerable stress as the result of sharply increased demand for communication services and resulting congestion in economically attractive parts of the radio spectrum. WARC-79 and related international conferences and meetings demonstrate conclusively that contention for access to the radio spectrum and its important collateral element, the geostationary orbit for communication satellites, presents new and urgent challenges to vital U.S. national interests. The growing differences among nations over the use of the radio spectrum and related satellite orbit capacity are reflected in the Final Acts of WARC-79.

Given the complexities of spectrum management in a changing world environment and the increased importance of telecommunication to both developed and developing nations, it is highly unlikely that traditional U.S. approaches to these issues will be sufficient to protect U.S. vital interests in the future.

From the U.S. standpoint, the results of WARC-79 are mixed. The proceedings of an administrative conference of ITU are generally geared toward arriving at decisions and adopting provisions that are acceptable to all nations with certain exceptions identified; an ITU member country is entitled to take a reservation indicating that it will not be bound by specific unacceptable decisions of the conference. Therefore, finding a useful way to measure success and to evaluate a country's relative standing following an administrative conference is not easy. Comparing specific U.S. proposals submitted in advance to the conference with the language of the Final Acts of the conference is not a straight-forward exercise. While such a comparison is important, it does not reflect the underlying reasons and motives for particular decisions, the problems encountered, or any apparent trends important in evaluating results of an administrative radio conference. It is important to understand the intervening events that underlie decisions, compromises, reservations, and postponements; not only to evaluate the results of WARC-79, but to prepare for the many future conferences important to U.S. interests.

Principal Findings

The most significant findings of the OTA study are the following:

1. There is an urgent need for higher level attention to Government policy coordination and accountability for international telecommunication issues generally and for spectrum management issues and international negotiations specifically.
2. Streamlined processes, coordinated Government policies, and sufficient resources on a continuing basis are essential to effective and timely preparation for the several major international conferences of ITU now scheduled to occur over the next 7 years.
3. New U.S. approaches are necessary to address radio spectrum and related satellite orbit issues in a changing world environment. Solutions to satellite orbit allocation and spectrum reallocation issues as envisioned by the Third World nations require strategies not yet developed or tested.
4. WARC-79 resulted in the loss of some U.S. flexibility in certain key spectrum areas—particularly those affecting national defense—and enhanced opportunities in many other areas.

5. Operating costs will increase for certain radio services; interference protection will become less certain; and administrative costs will need to rise to adequately implement WARC-79 decisions and prepare for future radio conferences.

General Observations and Trends

- The world environment for telecommunications has changed significantly in recent years; two-thirds of the 155 member nations of ITU can be classified as developing or Third World countries. There were 65 nations and seven groups of colonies present at the 1947 Atlantic City Conference, 80 nations and five groups of colonies at the 1959 WARC, and 142 nations (no colonies) at WARC-79.

- There are basic differences between the United States and Third World countries over the principles that should govern the allocation and use of the radio spectrum and related satellite orbit capacity. There is increasing need to identify and assess options to reconcile the sometimes sharply divergent goals of developing and developed countries.

- Third World countries are increasingly able to influence and shape international communication policies in international forums.

- The United States must maintain its technological leadership and expand its influence if future actions in a "one-nation, one-vote" forum like ITU are to be favorable to U.S. positions.

- There has been a gradual shift toward recognizing the legitimacy of nontechnical factors such as political and cultural interests and values in ITU deliberations. In other international forums, Third World countries here raised related issues under concepts of the New World economic order and New World information order.

- U.S. requirements for access to the frequency spectrum and geostationary satellite orbit locations are expanding with the explosive growth in telecommunication/information technology, the growing use of satellites, and the increasing dependence on radio and satellites for military and national security purposes.

- The disparity between nations in their ability to use the spectrum is growing; this leads to growing disagreement over the allocation and use of specific frequency bands for specific services.

- Spectrum decisions arrived at as a result of voting within ITU, as opposed to the commonly practiced consensus approach, will tend to be increasingly adverse to the United States.

- International telecommunication development is entering a phase in which regional and domestic needs and policies will predominate, as opposed to more general global facilities expansion. The thrust will be on intraregional communications and the development or enhancement of interregional communication routes.

U.S. Policymaking Structure and Processes for Spectrum Management and International Strategies

Need for High-Level Government Policy Coordination and Accountability

• The respensibility for spectrum management and policymaking is divided among several Federal agencies with coordination conducted on a structured, but often informal basis without clear responsibility and accountability for policy at a high level of Government.

• The United States does not have a consistent and coordinated national telecommunication policy because of a lack of appreciation and concern at the top levels of Government and industry, a lack of high-level policy coordination for international telecommunication negotiations, and a failure to assign sufficient importance to international telecommunication matters, including spectrum management and the State Department's role in international negotiations.

• The United States is not adequately equipped to provide comprehensive assessments required to effectively plan for the future use of the radio spectrum, to forecast future requirements, to assess the costs and benefits of shifts to new technology, or to evaluate alternative strategies to deal with international issues regarding allocation and use of the radio spectrum and geostationary orbit.

• Within the U.S. telecommunications industry there has been significant growth and change over the past 15 years that have produced more competing domestic interests with conflicting demands for spectrum use.

• The U.S. permanent spectrum management analytical mechanisms are not adequately equipped to review and verify all the stated requirements of Government and nongovernment spectrum users and to adjust needs consistent with national policy objectives. The United States lacks an effective ongoing means of collecting data and developing and adjusting guidelines to evaluate the merits of one spectrum use over any other.

• The State Department's International Communications Policy Office is not at a high enough level in the Department's organization to prepare adequately for all the important upcoming international conferences of ITU and make its influence felt in the upper echelons of Government and industry.

• Experts warn that lack of high-level concern has led to a shortage of trained and experienced spectrum management personnel to replace those retiring from Federal Government service; there has been insufficient attention to the need for personnel with supplementary diplomatic, language, negotiating, economic, and legal skills.

• The rather general wording of Executive Order No. 12046 establishing the National Telecommunications and Information Administration (NTIA) leaves it ambiguous as to how far NTIA can go in its coordinating role with respect to U.S. international telecommunications policy, particularly when that mandate risks encroachment on the general regulatory responsibilities of the Federal Communications Commission.

• The schedule of 10 major international conferences over the next 7 years to consider a number of issues vital to U.S. interests underscores our concern that the United States reform its policymaking mechanisms and streamline the cumbersome and time-consuming procedures for developing U.S. proposals for international telecommunication conferences.

- A mechanism is needed for collecting and evaluating information on the perceived needs of other nations for spectrum and orbit resources; their receptivity to intraregional and/or common-user systems, and other factors.

Need for New Strategies To Address Spectrum and Related Satellite Orbit Issues

- There are critical years ahead for ITU. For the most part, communication activities have been conducted by telecommunication experts and international diplomacy has avoided debate on ideology and politically motivated objectives. The trend towards basing decisions on factors other than economic and technical matters, and demonstrated need is challenging ITU to provide mechanisms for resolving differences among nations without a further shift toward the polemical norms common to international political debate.

- ITU is a political organization that performs both political and technical functions. However, while there is a primarily technical focus for most ITU activities, there has been a gradual shift toward recognizing the legitimacy of nontechnical factors, such as political and cultural interests and values. The United States must recognize this shift and develop strategies to use its technology more broadly as a tool for resolving international issues that are not subject to technical solutions.

- The success of ITU has been due in large measure to the willingness of its members to adhere voluntarily to commonly arrived at agreements and regulations. The inherent flexibility in ITU processes has also enhanced its effectiveness. Reservations and footnotes offer escape for individual countries from disagreeable decisions of the majority. However, excessive use of these exceptions by a sufficient number of countries—or by a few large users—serves to reduce the value of the agreements and regulations for all users. Almost 500 footnotes to the International Table of Frequency Allocations, and 83 protocol reservations taken at WARC-79, reflect increasing difficulty in reaching consensus.

- Many of the nontechnical issues raised in ITU—like those concerning reallocation of spectrum and guaranteed access to the geostationary satellite orbit—are among the many issues raised by Third World countries in other international forums under the principles propounded by the New World economic order and New World information order.

- The administrative regulations of ITU serve the desirable objective—without the use of sanctions for noncompliance—of avoiding the interference, incompatibilities, and chaos that would ensue if these or simular regulations were not followed.

- Developing countries will continue to seek changes in the existing mechanism for vesting rights in the use of frequencies and access to the geostationary orbit. They seek a shift away from the current notification and coordination procedure on a "first-come, first-served" basis, toward a negotiated plan developed on an a priori basis.

- Third World countries are likely to resist drastic changes in ITU rules and procedures that operate on the principle of "one-nation, one-vote" and that provide them with increasing influence and power. They will continue to seek technical assistance from the developed countries while pursuing ITU policies favorable to their own interests.

- Third World countries will continue to advocate changes in rules and procedures that help guarantee their access to the spectrum and geostationary satellite orbit. They do not wish to rely on the "good efforts," promises, and technical ability of the developed countries to "engineer-in" future systems on a case-by-case basis, as needed.

- ITU administrative radio conferences attempt to produce results that all nations can accept. Reservations, footnotes, and other means to reduce negative consequences allow each nation to more or less view the results as favorable. This approach supports the perception of having all winners and no losers. However, because of growing differences among nations these procedures are beginning to produce diluted and cumbersome results that may render existing mechanisms to regulate use of spectrum less and less meaningful.

- Because of competing interests and growing differences over use of the spectrum there will be winners and losers in the future as a result of the ITU decisionmaking process.

- WARC-79 showed the increasing influence of the Third World as a political force in ITU. The struggle for influence between the developed and developing nations will continue at future ITU conferences. At the present time, the developing countries derive their power from their collective numbers; the developed countries from their technical competence, know-how, and leadership. The influence of the developing countries can most effectively be exploited in ITU legislative forums; the developed nations' through ITU technical administrative organs.

- The preeminence of U.S technological leadership and technical ability served the United States well in international spectrum negotiations when decisions were primarily based on technical matters, but more and more U.S. problems with other countries involving the radio spectrum are influenced by political and economic considerations.

- The developed countries are expanding their use of spectrum to higher frequency bands as lower, more economical, bands become congested. They rely on technology to provide solutions to problems of accommodating new demands in the future. It is becoming increasingly difficult for the developing countries to accept the proposition that they will have access to spectrum on an interference-free basis at some future date as their needs materialize. The outlook is that the radiofrequency spectrum and the geostationary orbit will become more congested in the lower, more economic and desirable frequency bands even though use of frequencies by one country does not necessarily preempt those same frequencies from use by other countries.

- Certain U.S. spectrum requirements (e.g., for military radars) are not of interest to the majority of other countries. The difficulty that faces the United States in seeking to convince a majority of the 154 other ITU member countries to adopt regulations that accommodate U.S. radars in conflict with other possible uses by other countries is real and was demonstrated at WARC-79.

- Frequencies and satellite locations allocated to individual nations are not vested indefinitely under current ITU procedures, and changes in operating parameters require recoordination and registration. This creates uncertainty for present satellite system operators. The risks may increase that spectrum and orbit will not be available to provide for continuity of service from the present to the next generation of satellites. Moreover, this problem is not overcome by the adoption of a negotiated rigid a priori allotment plan to assure future access, since such a plan would tend to freeze technology and accommodate only those new or second generation satellites that fit the original technical scheme.

- The growing lack of agreement among nations over which specific frequency bands should be allocated for which specific ITU radio service classification (e.g., radiolocation, fixed-satellite, broadcasting) strongly suggests that mechanisms other than service classifications should be examined.

- The voluminous, complex, and detailed provisions of the international radio regulations are becoming more burdensome and less meaningful to individual users.

The Impacts of WARC-79

The specific consequence of WARC-79 decisions on U.S. interests regarding particular services can best be treated in terms of how the conference dealt with specific technical issues created by some significant trends in telecommunications. These trends include the following:

- The increasing demand for high frequency (HF) spectrum by the more developed countries to meet maritime and international broadcasting needs conflicts with the desires of the less developed countries to use HF for inexpensive domestic communications. The reduction in the use of HF (3 to 30 MHz) by international fixed point-to-point operations as satellite and cable use expands is not sufficient to offset this increasing demand.
- The rapid growth in very high frequency (VHF) (30 to 300 MHz) and ultrahigh frequency (UHF) (300 to 3000 MHz) land-mobile operations in the face of continuing vital U.S. military requirements, and the heavy use of these bands for TV broadcasting, now necessitates greater sharing of frequencies, e.g., by radiolocation-sharing with radionavigation and with other services, and by land-mobile sharing with TV broadcasting.
- There has been rapid growth of both domestic and international fixed satellite requirements in the super high frequency (SHF) (3 to 30 GHz) spectrum coupled with growth in microwave radio relay, space research, and Earth-exploration satellite services, and the continuing need to protect important radioastronomy operations. These requirements are being pressured by new demands to accommodate mobile, navigation, and broadcasting satellites (and their feeder links) in increasingly crowded orbits. Most of these satellite spectrum uses have military as well as civil applications. In addition, there is the continuing use of the SHF spectrum for terrestrial systems.

The actions of WARC-79 with respect to these operational trends, and the technical issues they raised, either closely reflected U.S. proposals or were acceptable to the United States with certain important exceptions. However, this judgment hardly does justice to the overall results of WARC-79, particularly the future implications to the United States. **The long-term trends may be running against the United States in the sense that more problems without apparent solutions are foreseen. The United States finds itself increasingly in a defensive mode, trying to minimize losses rather than seeking significant changes to improve its long-term posture.**

For example, at the same time that significant amounts of spectrum were added to the allocations for the fixed-satellite service (FSS), generally consistent with U.S. objectives, the conference also adopted a resolution that calls for a space planning conference to plan space services using the geostationary satellite orbit that was not consistent with U.S. objectives. The technical rules that affect the design and operation, and hence the cost, of satellite systems were in general agreement with U.S. positions, but the ability to implement new technologies and offer new services via satellite in the future depend in part on the decisions to be made at the space planning conferences in 1985 and 1987 and the broadcasting satellite conference scheduled for June 1983, to plan broadcasting satellite service (BSS) in region 2 (the Americas) in the 12-GHz band.

There is a significant difference between the approach advocated by the United States for using the geostationary satellite orbit and any rigid a priori allotment and planning approach that may be advocated by some developing nations. The United States, as well as many other countries, has consistently favored a flexible approach that assigns orbit locations and satellite frequencies on a case-by-case basis, often referred to as "first-come first-served." The U.S. approach seeks to accommodate needs as required and relies, at least in part, on technological advancements and good engineering practices to "engineer-in" the next satellite and accommodate all users. Such an approach is consistent with existing practice under ITU procedures for the notification, coordination, and assignment of radiofrequencies generally.

Many developing countries, on the other hand, see a detailed negotiated plan that assigns specific frequency channels and orbital positions to each country under a rigid a priori allotment plan as a means to guarantee them future access. This approach does not depend upon advances in technology or new engineering techniques to assure accommodation of newcomers, but neither does it provide for technological improvements that might accommodate growing requirements. The developed countries already have the economic and technological means of launching and utilizing domestic satellite systems; most developing countries do not, even though many do make use of joint-user systems like the International Telecommunications Satellite Organization (INTELSAT) global satellite system. The developing nations are concerned that as the "later comers" to ITU (hence later served) there will be little or no way to accommodate their domestic requirements.

Both a posteriori (the case-by-case approach usually relying on a notice and recordation procedure) and a priori (the collective subdivision approach usually relying on a negotiated plan) have won past acceptance at conferences of ITU. Over the last 75 years one or the other approach has been advocated and used by nearly all nations to allocate spectrum, both internally and internationally. On a domestic level, the a posteriori approach is often coupled with an adjudication procedure for deciding among competing applicants, as is the case in the United States. On the international level, adjudication is almost impossible because of sovereignty claims. Most nations have been unwilling to allow an international body to determine whether they can or cannot use a radio channel or satellite position. Where channels become limited, the recourse in the recent past has been to adopt an a priori method. However, for the allocation of radio bands and services, like FSS, which are affected by rapidly changing technology, or which are fraught with political controversy, a priori methods tend to promote too rigid technical specifications or exaggerated claims for channels. **Much of the controversy at WARC-79, and likely to emerge at future conferences, arises from the question of the appropriate administrative arrangements to determine rights to the use of frequencies free from harmful interference.**

Several countries made planning proposals at WARC-79, ranging in scope from planning all space services in all frequency bands allocated to space services, to planning only FSS in bands newly allocated to that service below 10 GHz. However, it is clear that FSS was the main target of these proposals. Developing a plan of this nature is an enormous undertaking and would not have been possible at WARC-79; however, acceptance of the principle of "planning" was a major goal of the developing countries.

The U.S. delegation worked to prevent any decision to convene a "planning" conference. When it became clear that such a conference would be approved, the United States argued successfully to keep the terms of reference rather broad. The first session of

"WARC on the Use of the Geostationary Satellite Orbit and the Planning of Space Services Utilizing It," scheduled for July 1985, will consider which services and which frequency bands to "plan." Further, the meaning of "plan" will be decided, and will not necessarily be a rigid "a priori" type. The operative thought in determining the type of planning is to provide "in practice equitable access" to the geostationary orbit. The second session of the conference, scheduled for September 1987, will meet to enact the decisions of the first.

It has been the official position of the United States, shared by a number of other countries, that a rigid a priori plan for FSS is bad planning and bad engineering; that it is likely to inhibit technological innovation, result in inefficient use of the orbit and spectrum, and have a major adverse impact on U.S. telecommunication systems. Thus, the United States faces a significant challenge over the next few years to develop compelling arguments against a rigid a priori approach and to carry that message convincingly to all parts of the world well before these conferences convene; or to find alternatives acceptable to all parties. Some possible alternatives are considered in the report and summarized below.

The adoption of the space planning conference resolution is a vigorous reminder that the effective management of orbit and spectrum utilization on both a worldwide and a regional basis is a continuing process that is becoming increasingly more difficult and complex. The achievement of U.S. objectives at ITU conferences is no longer a matter of reaching painstaking agreement on technical solutions to problems of frequency coordination and multiple usage of spectrum. It will also require sophisticated, political negotiations; imaginative, innovative approaches; and long, hard bargaining.

No immediate changes in operations using the radio spectrum or geostationary satellite orbit are required in the United States as a result of WARC-79. However, there are longer range impacts that require prompt attention: increased operating costs, reduced operating flexibility, uncertainty surrounding important pending issues, and the need for thorough preparations to address issues at future conferences.

There is no immediate cost impact imposed by WARC-79 regarding national security systems, largely because of the frequency flexibility of existing U.S. equipment, the success of the U.S. delegation at WARC, and reservations taken by the United States to counter adverse conference decisions. However, there will be future undetermined costs associated with frequency management, the development and procurement of more sophisticated equipment, compatibility studies, and coordination to prevent interference with competing users of the spectrum.

Department of Defense (DOD) interests were impacted by losses of exclusivity for radiolocation (radar) operations and by increased sharing with other services in many of the radiolocation bands. For example, demands that radar operations be discontinued in certain bands to accommodate expanded FSS operations led to considerable acrimony, which was only eased by a nonbinding U.S. commitment in a formal declaration to try to accommodate FSS in those bands. The status of radiolocation was retained but the pressure from competing fixed-satellite interests will certainly continue.

As an indication of concern for security interests, the United States took a reservation indicating that this country, in the operation of radars in certain bands, will not guarantee protection to, nor coordination with, other radio services. The action was necessary because so many countries took footnotes stating their intention to operate fixed and mobile radio stations in bands hitherto used exclusively by radars. Radars are designed to operate in the presence of interference, either purposeful or accidental. The degree to which these counterinterference techniques will have to be improved and used depends on how extensively other countries introduce fixed and mobile services in these bands.

U.S. objectives for the fixed-satellite service and the mobile-satellite service (MSS), including DOD airborne, shipborne, and ground-transportable Earth station systems, were achieved in large measure. Significant amounts of spectrum were added to allocations of the FSS and no operational or economic dislocations were imposed on any existing FSS system. No major burden appears to be placed on the U.S. Government or private operating entities in complying with the decisions of WARC-79 regarding FSS. However, the differences between the United States and many developing countries over approaches to use of the geostationary satellite orbit, to be resolved by future conferences, leaves the impact on FSS uncertain.

The U.S. objective to maintain the status quo for MSS in the 235- to 399.9-MHz band used for U.S. Naval Fleet satellite communications was partially achieved; however, coordination provisions (article N13A) were added which included a condition that stations in MSS not cause harmful interference to those of other services operating, or planned to be operated, in accordance with the table of allocations. The United States found this condition unacceptable, and together with most of its North Atlantic Treaty Organization (NATO) allies entered a formal reservation in the final protocol.

While WARC-79 largely eliminated frequency-sharing between FSS and BSS in the Americas, the latter must now share frequencies with the terrestrial fixed service, including private microwave systems widely used in the United States. This sharing could result in interference to BSS Earth station receivers operating in the same area as fixed station transmitters. The private microwave users are concerned that sharing with direct-broadcasting satellites is not feasible and that they may be forced to vacate the band. This concern is reinforced by footnote 37870 of the Final Acts of WARC-79 that places terrestrial services on a noninterference basis to BSS operating in accordance with a plan to be prepared at the 1983 region 2 broadcasting satellite conference. How this conflict will be resolved within the United States is a current matter before the FCC.

A U.S. objective at WARC-79 was to gain more frequency allocations for HF broadcasting (e.g., the Voice of America). This could only be done at the expense of the fixed service and was therefore opposed by many developing countries that use HF, shortwave radio for internal domestic communications. The HF broadcasting allocations were increased conditioned on the successful outcome of a specialized HF broadcasting conference to be held in the mid-1980's to "plan" for more efficient and equitable use of the broadcasting bands. While the conference agenda will be relatively broad and open, it was apparent at WARC-79 that the United States and the developing countries have significant differences as to the type of planning to be undertaken.

Improving U.S. Spectrum Management and Preparation for International Telecommunication Conferences

Consistent with the findings of past study commissions and task forces going back to 1950, this study finds that the present U.S. Government structure for spectrum management and participation in international telecommunication conferences is inadequate. Primarily, the problems stem from the absence of high-level Government attention to effective policy development and coordination on a consistent and continuing basis with centralized accountability.

At least four options are available to the Congress in addressing this issue: 1) maintain the status quo and make no changes; 2) maintain the present structure, but raise the level of attention and accountability within the responsible agencies; 3) establish a mechanism—such as a task force of high-level Government officials—to develop, examine, and make recommendations on structural and procedural improvements, or; 4) establish a permanent board, council, or interagency committee of high-level Government officials to be responsible and accountable for international telecommunication policy coordination and the preparations for international conferences.

Certain shortcomings in spectrum management could be corrected without any fundamental change in the structure of FCC or NTIA. Assigning spectrum management a higher priority, particularly within FCC, and using resources more efficiently would make a significant difference. For example, FCC could improve its data base for spectrum management with the help of its own computer and spectrum experts.

The validation of spectrum requirements, and the apportioning of spectrum between Government and nongovernment users, Needs closer scrutiny. A mechanism using analytical tools to help evaluate needs and assess priorities among competing users of the spectrum would provide decisionmakers with basic information and data for use in establishing policies and reviewing requirements. While Federal spectrum requirements are reviewed by the Interdepartment Radio Advisory Committee and its Spectrum Planning Subcommittee, this function needs to be strengthened and broadened to effectively consider longer range impacts. Economic techniques (e.g., auctions, lotteries, spectrum fees, resale of frequency assignments, etc.) should be considered, at least on an experimental basis, to provide guidance on the consequences of different spectrum allocation decisions and the introduction of newer technology. These should include techniques for evaluating the relative economic viability of alternative radio uses, as well as radio v. nonradio communication systems. Experience with economic techniques could be gained by limited application to certain selected services and frequency bands.

There have been problems in the timely formation of U.S. delegations for ITU conferences arising from the need for the early inclusion of experts from industry and other nongovernment organizations. Preparations for international telecommunications conferences could be improved by replacing the ad hoc approach with an ongoing conference preparatory structure with a focal point for high-level responsibility and accountability and involving all the concerned Government and nongovernment telecommunication interests. These problems could be addressed and the effectiveness of U.S. participation in international telecommunications meetings improved by the following additional steps:

1. Industry and other nongovernment delegates could again be permitted to participate fully as U.S. representatives at international telecommunication conferences and take any assignments on the delegation for which their skills and experience qualify them. Legislation to accomplish this passed both Houses of the 96th Congress. However, the legislation to which it was added was vetoed by the President for reasons unrelated to the exemption.
2. Consideration could be given to finding means to comply with due process requirements under the Administrative Procedures Act and still name industry and other nongovernment representatives to delegations on a timely basis.
3. Guidelines and implementing mechanisms could be established for naming the chairman and individual members of U.S. delegations. The qualifications required, the distribution of skills needed, and type of representation desired could

be determined at an early stage of conference preparation. Individuals chosen to serve on the delegation could be selected from the best candidates available, especially those who participated in the preparatory effort. Whatever special Government assistance is required to assure particular representation could be made available in the early stages of conference preparations.

U.S. Strategies for Dealing With International Spectrum Issues and ITU

U.S. participation in ITU faces new and difficult challenges. Having started in 1865 as a relatively noncontroversial organization of 20 nations concerned with the interoperability of their telegraph systems, ITU has evolved into a tendentious assembly of 155 nations that look to ITU to solve fundamental issues of resource allocation increasingly vital to economic growth and development.

The ITU structure, which was well suited to the analysis of interference between radio communication systems, and to achieving a consensus on noncontroversial matters among a small number of broader issues, is sorely tested by the demands of numerous countries exhibiting the widest possible range of technical, economic, cultural, and political backgrounds. An organization that has traditionally been concerned with technical and operating standards for radio equipment and administrative mechanisms that give a country the right to operate radio stations free from harmful interference from others is being asked to satisfy the demands of developing countries for "guaranteed access" to an equitable share of the radio spectrum and satellite locations that many of them have no immediate capacity to use.

It is increasingly questionable whether U.S. negotiating skills and technological proficiency can secure essential U.S. goals and objectives in a forum that employs a "one-nation, one-vote" decisionmaking formula and in which the United States and the other industrial countries are greatly outnumbered by the less industrialized member countries.

From a strategic standpoint, the United States has a wide range of options. At one extreme, the United States could conclude that the drawbacks of continued participation in ITU outweigh the benefits, and withdraw from the organization or decline to participate in its deliberations. At the other extreme, the United States could decide to avoid controversy within ITU and simply yield to other nations on controversial matters. Between these extremes are a number of alternatives. One that requires no structural or procedural changes in ITU would be better coordination of U.S. views and objectives with other nations in advance of ITU meetings, and better U.S. planning based on improved understanding of other nations' views.

Another strategic option would be for the United States to seek to remove the most controversial issues from the ITU forum and attempt to solve them in other ways. A current example would be to respond to the demands of developing countries for "guaranteed access" to radio spectrum and satellite locations by developing the institutional arrangements to ensure domestic communication services to qualifying nations. This could be a common-user satellite system either building upon the present INTELSAT structure or creating a separate system for domestic services.

From a structural standpoint, assuming that ITU can be changed, a number of options may be available. The United States could seek to revise the voting formula of ITU to one more fair to the United States, perhaps by giving added voting weight to those countries that contribute most heavily to the United Nations budget. A more modest proposal would be to increase the number of ITU regions beyond the present three so that regional issues could be dealt with by a smaller number of countries most directly concerned.

Withdrawal From ITU

Would withdrawing from ITU guarantee the United States unhindered use of the spectrum allocation or frequency assignments the United States needs? Probably not. ITU members rely on the organization to avoid interference from the radio signals of others and to achieve interoperability of certain mutually used systems, such as radionavigation. The assignment of a particular frequency is of little value if others feel free to use it for purposes that cause interference. There are no effective international sanctions to force compliance with ITU decisions. Therefore, the United States relies, as do all nations, on the voluntary agreement and cooperation of other nations to refrain from interfering with its use of the spectrum.

For applications that are vulnerable to interference, U.S. preemption of spectrum (i.e., use what we wish to use) would be ineffective because any nation that chose to interfere, whether for a valid need or by intentional jamming, could greatly reduce the value to the United States of the preempted spectrum. Any preemption for uses that were invulnerable to interference (e.g., high-power radar systems with electronic countermeasure capacity) would likely result in retaliation by other nations in areas where the United States is vulnerable.

It is conceivable that the United States could abandon ITU and establish a more congenial grouping of developed countries as a forum for coordination to avoid radio interference, and simply ignore other countries. Coordination and information exchange would become less certain, but still fairly effective. However, it is likely that ITU would disintegrate if the principal developed countries abandoned it. Overall, the lack of a central spectrum allocation and coordination authority with global participation would probably lead to a more fragmented use of the spectrum, with fewer common worldwide channels, less standardization, and possible difficulties with interoperability of certain common systems, and a general increase in interference problems between services.

Revised ITU Voting Formula

As an option less drastic than withdrawal from ITU, the United States might join with other industrial nations to force a revision of the ITU's "one-nation, one-vote" decisionmaking formula toward one that would reflect the dominance of these nations in the actual use of the spectrum. If successful, this option would greatly reduce the ability of the Third World nations to block or force changes in U.S. positions.

A revised voting formula might reduce the contention over spectrum allocation matters at ITU; make ITU more efficient; help to make spectrum use more efficient by precluding the adoption of unworkable allocation schemes; and be no less fair than the voting practices used in a number of other international bodies that benefit Third World nations without being controlled by them. The stimulus for concurrence of Third World nations with such a proposal would be the possibility that, were it rejected, the developed countries might withdraw from ITU and render it essentially irrelevant.

The reaction of Third World nations is difficult to predict, but it seems most likely that they would bitterly resist any reversal of their recent successful trend toward fuller participation and refuse to make any concession on ITU voting formulas. From a general foreign policy standpoint, it is important to consider how much support the United States might obtain from other developed countries, many of which do not feel the spectrum problems as acutely as the United States. The United States must also consider whether it wishes to take an assertive policy stance toward ITU apart from a generally more assertive stance toward Third World nations.

It may not be necessary that the proposed change in voting arrangements apply to all ITU spectrum decisions, but just to those allocations that might qualify as major matters. The latter case is equivalent to establishing a new, separate forum with revised voting arrangements and routing major matters to that forum rather than to ITU.

Objectively, it would seem that the interests of the developing countries lie with the continued existence of ITU and with continued technical and economic aid from the developed countries. If this choice were clearly and convincingly drawn, the Third World nations would probably come to realize that these benefits outweigh such hypothetical advantages as satellite orbital slots that many do not have the capability to use. Whether they would ultimately decide the matter on objective grounds is difficult to predict. In any event, it appears unlikely that a change in voting within ITU is possible under the present structure.

Increased Regionalization of ITU

At present, ITU divides the world into three geographic regions and many issues that can be treated separately and effectively in a single region are considered in this way. (Region 1 covers Europe, the U.S.S.R., Turkey, Mongolia, and Africa. Region 2 covers North, Central, and South Americas, the Caribbean, and Greenland. Region 3 covers South Asia, Australia, New Zealand, and the Pacific.) Regional administrative radio conferences are scheduled on a variety of specific issues, allowing WARCs to "spinoff" certain controversial matters. One option would be to extend this process of regionalization on a geographic basis to smaller subregions, and/or on an issue basis to include only those nations directly affected by the particular issue. The purpose would be to reduce the number of nations debating or voting on issues that do not affect them directly, thus reducing unnecessary contention.

WARC-79 was attended by 142 nations. Approximately 1,670 delegates and advisors met for 11 weeks and considered nearly 17,000 proposals (more than 900 from the United States), and held more than 900 meetings. Surely any approach that might help limit further WARCs to more modest proportions would be worthy of study. More importantly, when nations vote on issues that do not directly affect them the opportunities to trade votes at no cost to themselves, but which help others to sustain confrontations. Large meetings also tend to encourage bloc voting, which has already begun to emerge at ITU. Thus, subdividing ITU into smaller units, either on the basis of geographic subregions or on the basis of particular issues, would divide the Third World bloc into smaller, less dominant groups.

Decentralized decisionmaking does not guarantee that the U.S. position will prevail. Being outvoted by 10 to 1 is no more satisfying than being outvoted by 154 to 1. However, it is easier to bargain in detail with 10 nations than 154, and if a quid pro quo must be offered, the total cost is likely to be lower.

The mechanics and economics of increasing substantially the number of conferences is also important to consider. The limited U.S. professional staff available to prepare for and attend spectrum conferences is already stretched thin, and if the United States does not wish simply to skip many of the meetings—a risky proposition—this staff would need to be considerably augmented. The developing countries would find it even more difficult to prepare for a heavy schedule of meetings.

Increased decentralization of ITU could, in principle, lead to greater fragmentation in the use of the spectrum, with the same bands being used for different purposes in different regions to a much greater extent than is now the case. While this may be acceptable in the short run, the long-term implications are worthy of study. If, for example, a new service were proposed that would be global in character, obtaining the necessary global spectrum allocation might require changes in the allocations to many different services in many different locales. At the least, it might be necessary to create an institutionalized system for coordinating decentralized decisions.

Better Coordination and Planning

As a relatively conciliatory approach, the United States could mount a major effort to develop long-term plans for spectrum use that would take into account the spectrum requirements of developing nations, to aid them in understanding the realistic options available to meet their short- and long-term needs, to offer such technical and economic assistance as might be needed to enable them to participate actively in the planning process, and to seek their concurrence with fair, objective, and realistic proposals.

To a significant extent, the confrontations initiated by Third World nations in ITU are based on suspicion and mistrust of developed countries. Perhaps this is based on a lack of understanding of the true potential of technology to create the spectrum resources they will need in the future. But many Third World nations also question whether they will be able to take advantage of that technology and they question the good faith of the developed countries to share the benefits of advanced technology.

The fact remains that there is adequate spectrum for all nations at the present and that technology will very likely expand the effective utility of the available spectrum to satisfy future needs. The problem for the United States is to convince other nations, particularly the developing countries, that spectrum and orbit capacity will be available and that their needs for service can be satisfied. Technical assistance can be very useful in this regard, and economic assistance can help make the benefits of technology a reality. Creating a role for the developing countries in cooperative planning efforts is likely to make them more receptive to the positions and plans that are forthcoming.

Long-range planning of spectrum utilization is presently inadequate and not easily accomplished in an area where technological rate of change is rapid and in a competitive system like that in the United States where policymakers are more likely to be responding to problems than to be developing long-range plans. However, better long-range planning for telecommunication services and spectrum needs is clearly necessary to cope effectively with the ITU allocation process. Developing and sharing planning techniques and data with other countries would not make a new planning process vastly more difficult or costly, and might make it more reliable in the long run.

It is also necessary to know the extent to which developing countries' positions at ITU are based on their own vital interests rather than on misunderstandings and politics; it is unlikely that they would compromise vital interests for the sake of comity. A cooperative planning process would tend to expose true interests and clarify the negotiations.

As a practical matter, the majority of the developing countries cannot now make use of advanced communications technology without technical and economic assistance from technologically advanced countries. If the majority of nations were to vote to adopt rules that limit or preclude the use of advanced technology to which they do not have independent access, communication capability would suffer and costs would increase in the long term for all users. Thus, the cost of assisting other countries in using advanced technology must be balanced against the cost to the United States of not being able to take full advantage of such technology ourselves. This equation deserves close analysis.

Cooperative planning has worked in the past; the United States was a leader in cooperative planning for INTELSAT and the International Maritime Satellite Organization (INMARSAT). The exact mechanism for cooperative planning is an important and complex matter, made more difficult by divided responsibility in the United States for communications policy in general and spectrum planning in particular. However, it should be possible to graft onto the existing structure a sufficiently comprehensive mechanism with high-level responsibility to assure effective long-range planning and to foster cooperation with other nations.

As an alternative, ITU could be invested with a planning staff to undertake long-range coordination, analysis, and planning. Such a "neutral" planning expertise might be less likely to be mistrusted by Third World nations, and perhaps more capable of defusing potential disagreements. Naturally, the United States would participate in the process and perhaps may more easily influence a planning process in which the measure of power is technical expertise, rather than influence an ITU conference in which the measure of power is votes. The United States has consistently opposed any increase in the power of ITU, particularly, efforts to expand the planning role of the International Frequency Registration Board.

A broader, more extensive, and more conciliatory approach to international spectrum planning would be required under this option and could have a real chance of success, given some major changes in the U.S. approach. In the long run it could be the least expensive and most effective option available to this country.

Common-User System

As an alternative to contention for satellite slots on the geostationary orbit, the United States and other developed countries could enter into a joint venture with developing countries to construct, launch, and operate a common satellite system to meet domestic needs for telecommunication and/or broadcast services. The developed nations would provide the private capital and technological resources necessary to construct and launch the system, and would operate and manage it in conjunction with other using nations. All nations in the joint venture would have the option of purchasing a share of the common enterprise, up to their actual percentage of use of the system, and sharing proportionately in any profits. Such an arrangement would be similar to that governing the INTELSAT global satellite system used for international telecommunications. High-capacity satellite systems employing technology to make a common-user system economic and operationally attractive to developing countries for domestic services could be part of the existing INTELSAT structure or a separate structure established for this purpose.

Many developing nations are concerned that the satellite orbit locations are being occupied rapidly on a "first-come, first-served" basis, and that by the time they are in a position to use satellite systems there will be no desirable orbit locations left for them. It seems clear that the requirements of developing countries will be for satellite service and not for satellite orbit locations that they may not be able to use. This option would provide service without allocating dedicated orbit locations for individual users.

Moreover, the cost of developing and launching a dedicated satellite system is very high, well beyond the capability of most developing countries for the foreseeable future. This option could provide satellite service well in advance of the time these countries could afford their own systems, and much more cheaply. No large initial capital investment would be required from user nations, and there would be little risk.

While this policy option does not address the full range of problems before ITU, it does offer the prospect of relieving the pressure on a particularly important and contentious issue. If low cost and technically attractive domestic satellite capacity is made available through an international organization that accommodates the sovereignty interests of each country, many developing countries could come to see access to orbital slots and satellite frequencies as a side issue with availability of service being the main objective. Increasing adoption of the INTELSAT-type alternative would free up orbital slots for those major developing countries that continue to desire their own separate domestic systems whether for political reasons, or because requirements justified such a system economically.

A common-user system need not require any Government funding by the United States. Sufficient capital and technical resources exist in the private sector in the United States, and within Europe and Japan, to construct such a system as a commercial venture with expectations of future markets for follow-on equipment and services. Alternatively, such systems could conceivably be initiated with World Bank loan guarantees.

"A Priori" Allotment

The United States could agree to participate with other nations in the development of a long-range plan for the utilization of satellite orbit locations to serve participating nations' domestic communications requirements. This plan would assure that orbital slots would be available for the use of all nations when needed. In exchange for this agreement, the developed nations would likely insist that the plan be based on sound operating principles and be updated regularly to take account of the latest, most efficient technology available.

A priori allotment of satellite orbit slots has been a cause celebre among developing countries. At WARC-79, a resolution was adopted to consider this issue at a two-part space planning WARC in the mid-1980's. The United States has opposed a priori allotment plans for satellite service as wasteful and inhibiting to technological advancement. Although this option goes a long way toward accommodating the position of the developing countries, it maintains a substantial degree of flexibility important to the United States, including the key qualification of a requirement for regular technological updating that would help to avoid the worst consequences associated with rigid allotment schemes.

As far as the United States is concerned, certain types of a priori allotment plans would not be as objectionable as others. Plans based on sound engineering and operational parameters might be workable internationally, at least on a regional basis. Indeed, U.S. domestic satellite operations are based more or less on an a priori approach. In the long run the United States may have enough satellite capacity, made possible by advanced technology, to meet domestic needs even if the orbit and system available to the United States is reduced. In the short run, the United States already has substantial numbers of operational satellites with additional satellite systems planned for operations in the near future.

In addition to the possible advantages that may result from improvements in technology, there are two factors that may help reduce the impact of a priori allotment plans on the United States. One is advanced technology, including cellular satellite technology, already on the drawing boards, which will permit the construction of a large, wideband satellite that can provide very large capacity from a single orbit slot. The other factor is the particular geography of region 2 (North and South America). From the standpoint of using the geostationary satellite orbit, region 2 is naturally divided into two parts—those nations located in the Northern Hemisphere and those in the Southern Hemisphere. A second geographic factor that serves to separate the hemispheres is the displacement in longitude of the nations in the Northern and Southern Hemispheres. Also, those nations closer to the Equator enjoy the widest possible visibility of the orbit and have the greatest flexibility in positioning satellites. Moreover, the North American Continent consists of three countries with very large land areas that made the use of advanced technology using shaped-beam antennas attractive.

Although an a priori plan is implied in the approach, it could be implemented without the adverse limitations of a rigid a priori plan such as adopted at the 1977 WARC. If this approach is possible, then an a priori allotment to one country would not include using the same allotment for others if certain technical and operational guidelines were followed.

There may even be some benefits to the United States from adopting an a priori allotment plan. At present, there is considerable uncertainty about the outcome of the 1983 Region 2 Broadcasting Satellite Administrative Radio Conference and the space planning conferences in the mid-1980's. If a decision is postponed, the uncertainty would continue. A situation would then be perpetuated in which any existing domestic satellite orbit slot may be withdrawn in the future. Moreover, no satellite system designer could plan the logical evolution of a proposed system with confidence that the required additional allotments would be available. This would force designers to plan their systems on the basis of short-term recovery of investment.

It is also important to examine the tactical aspects of agreeing to an a priori allotment policy. By participating in the development of a plan, the United States would be in a position to influence the type of plan adopted and possibly gain concessions on other issues of importance to the United States.

In short, the linkages and tradeoffs among these and other possible approaches to future use of the geostationary satellite orbit cast each U.S. policy option in a different light. Careful review in each case is needed for sound policy formulation. Rather than rejecting a priori allotments as inherently wasteful, it may be in the U.S. interest to examine the practical effects, to examine the possibility of a quid pro quo, and if the result looks acceptable, to work with the developing countries to implement the plan.

U.S. Options Regarding the Final Acts of WARC-79

As the largest and most technically advanced user of the radio spectrum on a worldwide basis, the United States approached WARC-79 with the greatest stake in reaching agreement on a new table of frequency allocations and a revised set of related technical and administrative regulations.

While the Department of State has indicated official U.S. satisfaction with the outcome of WARC-79, the United States ultimately took six reservations in the final protocol to the Final Acts of WARC-79, helping to bring the overall total to 83. Two of the six were directed at political issues, but the remaining four were directed at decisions that could have a direct impact on U.S. telecommunications operations.

The Final Acts of WARC-79 will ultimately come before the U.S. Senate to be considered for ratification as a treaty. There are several options available:

1. **The United States can ratify the Final Acts without delay.** Completing the ratification process prior to January 1, 1982 when the 1979 radio regulations enter into force will indicate to other nations our goodwill and determination to abide by our international obligations. The Final Acts constitute the "radio regulations, Geneva, 1979," which replace the

1959 regulations as partially revised by the administrative radio conferences held in 1963, 1966, 1971, 1974, and 1978. The Final Acts also incorporate the provisions of the 1977 broadcast satellite WARC as modified by WARC-79.

2. **The United States can ratify the Final Acts with conditions, thereby underscoring and making explicit the reservations taken at Geneva.** In particular, the United States could reiterate the reasons for taking reservations in the protocol to the Final Acts to emphasize U.S. concern regarding the issue raised.
3. **The United States can ratify the Final Acts with additional reservations** that either state U.S. refusal to acquiesce to particular decisions taken at WARC-79, beyond those cited in earlier U.S. protocol statements, or set forth U.S. policy with respect to future actions by ITU or specific implementation of the WARC-79 Final Acts. While it is not uncommon for the U.S. Senate to attach conditions to a resolution of ratification of a bilateral international agreement, which the other party can readily accept or reject through its own ratification processes, attaching conditions to a multilateral agreement raises difficulties.
4. **The United States can ratify the Final Acts in part,** specifically withholding ratification of those provisions (which would have to be listed in precise detail) where the United States chooses to remain bound by the provisions of existing regulations previously ratified (which would also have to be listed in precise detail).
5. **The United States can withhold ratification of the Final Acts pending the outcome of several important international conferences dealing with telecommunications issues.** This would deny FCC and the current administration any legal basis for implementing decisions taken at WARC-79, many of which were strongly advocated by the United States and fought for by the U.S. delegation and which are scheduled for implementation by other ITU members on January 1, 1982. The most immediate international telecommunications conference of great importance to the United States is the September 1982 plenipotentiary. The actions taken at this conference to revise the ITU convention will be basic to all future conferences of ITU.
6. **The United States can reject the Final Acts of WARC-79 in their entirety** and announce that we intend to abide by the preexisting radio regulations, as amended. The consequences would be similar to those cited above.

Chapter 2

The Changing Requirements, Influences, and Motivations Among Nations for Use of the Radiofrequency Spectrum

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Chapter 2

The Changing Requirements, Influences, and Motivations Among Nations for Use of the Radiofrequency Spectrum

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Introduction

By any measure, the 1979 World Administrative Radio Conference (WARC-79) was a complex international event. The facts are deceptively simple. For 11 weeks in the autumn of 1979, between September 27 and December 5, the nations of the world met at Geneva as a legislative organ of the International Telecommunication Union (ITU), a specialized agency of the United Nations (U.N.). The conference produced a 984-page document—the Final Acts of WARC-79—which sets forth regulations, resolutions, and recommendations for radio communication worldwide. For most nations of the world, those Final Acts will represent a multilateral treaty and a basic source of public international law. The U.S. Senate must give its advice and consent to ratification before the United States becomes a party to the treaty.

These simple facts, however, do not begin to explain why hundreds of thousands of staff-hours, millions of dollars, and tens of millions of pages were expended in preparation for, and conduct of, this conference. They also do not explain why so many telecommunication specialists and policymakers around the world have focused on and analyzed this conference and the events surrounding it. The purpose of this report is to examine WARC-79 in a comprehensive way—describing U.S. preparations and involvement, and the impact of the conference. However, no attempt was made to examine all issues and aspects of WARC-79, but rather to focus on certain important results and analyze their consequences for the United States.

WARC-79 was held to reach global agreement concerning the international arrangements necessary for efficient and interference-free use of the radio spectrum. ITU brings nations together almost continuously at meetings and conferences necessary for coordinating the use of all telecommunications (conveying information by wire, radio, fiberoptics, etc.). WARC-79 was special because of the broad scope of its agenda, which included most of the major arrangements relating to use of the radio spectrum. These arrangements are of two major types: 1) technical and operational standards; and 2) administrative mechanisms that give member countries the right to operate particular radio stations free from harmful interference from others. Governments around the world have their own national arrangements for this, and devise necessary international arrangements through ITU. This activity is often referred to as "spectrum management."

The first function, relating to technical and operational standards, consists of establishing specifications concerning the way radio equipment should perform, the way it should be operated (particularly in emergency situations), and which portion of the spectrum should be reserved for particular kinds of radio uses. This last function is usually accomplished by defining certain kinds of radio "services" such as broadcasting, mobile, radiolocation, etc., and setting forth a "table of allocations" indicating which frequency bands are reserved for particular services. Both in the United States, and in ITU, much work usually surrounds the preparation of the table of allocations. Indeed, much of the work at WARC-79 was devoted to this task.

The second major management function, determining rights in operating radio stations is not always easily accomplished to everyone's satisfaction. Whether domestically or internationally, when radio channels become limited, and the possibility of stations interfering with each other on the same frequency becomes likely, some kind of administrative arrangement must be established for deciding which country has the right to operate a radio facility free from harmful interference in a given geographical area. In the domestic situation, a government agency simply devises and enforces methods of doing this. On the international level, the matter is more complicated because every nation regards itself as absolutely sovereign, unwilling to be governed by the dictates of any other nation or an international organization. As a practical matter, however, the desire to maintain interference-free radio communication has led most nations to follow arrangements fashioned at conferences of ITU.

The role of communications within a country depends on its political system, the state of economic development, access to technology, and the nature of its society. No two countries are exactly the same and the use of communication varies greatly among the countries of the world. On a broad basis, distinctions are generally made among three groups: the more highly developed industrial democracies; the varying stages of development in the East bloc countries; and the developing countries of the Third World. While these distinctions are significant, there are also many important differences within each of these broad categories.

The United States, for example, is unique in many ways. While most countries have placed the ownership and operations of telecommunication systems in government or public hands, the United States supports private ownership and commercial operations. Government ownership and operation of communication systems are reserved for those cases where commercial systems are either not available, or inappropriate, as in the case of some military operations. Even so, a large part of U.S. military communications are handled by commercial systems. The United States is dedicated to the principle of free enterprise with private and public access to the radio spectrum.

The differences between the Western nations and the East bloc countries have been reflected in world forums like the United Nations for many years. However, the most basic change in the distribution of influence in the world has been the emergence of over a hundred developing nations since World War II. Even more significant is that these nations are increasingly organized around their common plight of underdevelopment and they have exercised increasing influence and power in international arenas where votes are cast on the basis of "one-nation, one-vote." This does not mean that there is solidarity among Third World countries on all communication and radiofrequency spectrum matters. On the contrary, there are many and varied differences among such diverse nations as India and Indonesia, Nigeria and Tanzania, or Brazil and Cuba. Nevertheless, on matters of broad principle and approaches to the use of world resources and management of the radio spectrum and the geostationary satellite orbit, the focus of world politics has shifted towards the Third World. There are many questions and issues surrounding the Third World call for redistribution of the world's resources, for technology transfer, and for changes in the way world news and other information is disseminated. The United States is dedicated to the principles of free flow of information and freedom to express ideas.* In many countries the media are government controlled or financed and alternative sources of private capital are limited. These and other issues are encompassed under the general titles of "New World economic order" and "New World information order" now under debate in world institutions like the U.N. Educational, Scientific, and Cultural Organization (UNESCO).

Can the United States Disregard the Motivations of Other Nations?

The United States, like all other nations of the world, can ill afford to have its vital communications disrupted by interference from radio transmissions of other countries. Consequently, it must be aware of other nations' motivations for frequency utilization and cooperate within reasonable limits. There is an underlying incentive among all nations to avoid interference to their individual domestic operations; to communicate among one another using international facilities on an interference-free basis; and to cooperate generally to minimize differences in the allocation and use of frequencies. There are also many diverse interests and each country seeks to maximize its own position in the give and take of international compromise. The complexities have multiplied and efforts to cooperate and achieve a measure of uniformity among nations in their use of the radio spectrum and geostationary satellite orbit have become more difficult. This is not unexpected given the increasing reliance of both the developed and developing worlds on use of the radio spectrum and geostationary satellite orbit; the growing disparity among nations over particular needs and existing investments in various parts of the spectrum; and the philosophical differences becoming more evident with the growing influence of the Third World.

How Dependent is the United States on the Radiofrequency Spectrum Including Use of the Geostationary Satellite Orbit?

The United States and other highly developed countries like Canada, Japan, and those of Western Europe are moving from the industrial age to the information age. This means that a large and increasing share of the gross national product (GNP) of these countries arises from information-related services as opposed to agricultural and manufacturing activities. The GNP of the United States is approaching $3 trillion. Almost half of all U.S. economic activity is a result of the collection, organization, analysis, and dissemination of information and information-related services. Much of this is now handled via microwave radio relay or domestic satellites. Thus, the United States has an ever-increasing dependence on the radiofrequency spectrum and the geostationary orbit.

Since the 1940's, the United States has been the acknowledged world leader in the telecommunication field. Supporting technologies range from transistors, semiconductors, and chip technology to microprocessors; and from microwave and coaxial cable to satellite and fiberoptics. The productivity of the U.S. telecommunication industry has grown more than twice as fast as productivity for the U.S. economy overall since 1950. The result has been that within a single generation the communication and information industry has become one of the most productive and vital in the world. Current estimates place the market for world telecommunication, electronic, and computer equipment and services at $250 billion per year. The United States has a 45-percent share of this market that is growing at an annual rate between 10 to 15 percent. Worldwide revenues from telecommunication services alone exceeded $170 billion in 1980.

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*While the United States is dedicated to the principles of free flow of information and freedom to express ideas, it should be noted that both in practice and in theory these principles are not absolute. For example, information is not free; first amendment rights have restrictions, and there is no right to access to media other than the limited rights under the Fairness Doctrine's equal time provisions and right to reply to personal attacks.

Advances in technology have revolutionized the supply of telecommunication equipment and services. The economic and social structure of the United States is tied directly to the availability of the radio spectrum and the geostationary satellite orbit to support the high growth telecommunication/information industry. U.S. defense systems, vital to our national security and that of our allies, depend on the radio spectrum and satellite orbit availability. Defense operations are making increased use of both space and terrestrial systems that use the radio spectrum and every element of the defense structure must continue to have timely and flexible access to the radio spectrum to carry out its mission for national security.

The number and variety of users and services continue to expand in an information society. The commercial, private, public, and government telecommunication users all compete for use of the radio spectrum. Other industries like transportation, entertainment, banking, trade, and the news media place increasing demands on telecommunication services. Airplanes don't fly, TV programs aren't aired, financial transactions cease, orders go undelivered, and important world events go unreported without modern communications. Growth in traditional and new telecommunication services has created new demands for spectrum/orbit availability. For example, before 1965 and the launch of the first commercial communications satellite (Early Bird) there was no demand for satellite frequencies and concerns over parking slots on the geostationary orbit were nonexistent. Today, close to 100 communication satellite systems, with several satellites each, are in operation or in the planning stage. The issues over use of the geostationary satellite orbit are growing more intense and the potential consequences are far-reaching both nationally and internationally. Four U.S. domestic satellite systems are operational and three additional systems are being planned. Some 25 U.S. commercial satellites providing a range of domestic communication services from basic telephone circuits to direct-to-home entertainment may be operating within the next 5 years. International decisions about use of the spectrum/orbit will have great bearing on the future of commercial satellite service and on U.S. military satellite systems.

At the same time that new services expand, the traditional uses of the spectrum like AM, FM, and TV broadcasting grow. Almost 70 percent of the national telephone network (circuit miles) is composed of radio relay systems using microwave frequencies to carry long-distance communications. Business, industrial, public, and individual usage of radiofrequencies range from taxis and CB radios to oil pipeline management, and search and rescue operations.

The Federal Government is by far the heaviest single user of the radio spectrum and the Department of Defense (DOD) uses more spectrum than any other agency. This includes early warning defense systems of ground and airborne radars, Navy fleet command and communication systems, air navigational aids, enemy detection and location devices, and modern electronic weapons that use communications as an integral part of their operations. DOD has also produced much of the new technology that has led to broader uses of the radio spectrum.

Some additional examples of Government use of the radio spectrum help illustrate the reliance that a developed nation, like the United States, places on interference-free operation of the radio spectrum. The Federal Aviation Administration provides navigational and air traffic control service to commercial, civil, and Government aircraft representing about 35 million flights a year. The Department of Justice is a major user of radio for law enforcement, crime prevention, and detection activities. The National Weather Service operates weather radars, balloon stations, and meteorological satellites for forecasting land and sea weather. Without access to the radio spectrum there could be no space exploration program and the National Aeronautics and Space Administration (NASA) would have no reason to exist.

How Different From Other Countries is the United States in Its Need and Use of the Radio Spectrum?

The United States and other developed countries with sophisticated communication infrastructures focus much attention on their need to apply new technology, offer a variety of advanced services, and support military and other Government functions and services. Generally these objectives go far beyond a basic need to communicate. They involve the complexities of satisfying the competing and often conflicting requirements that come from a host of business, social, political, national, and institutional objectives.

The developing world, on the other hand, is much more preoccupied with the need to establish a basic capability, gain self-reliance and control over their own communciations, and harness the powers of communciations for educational, social, and economic development. These differences in the stage of development and basic needs are reflected in disputes over specific frequency spectrum allocations as well as disagreements over fundamental principles that govern allocation and use of this unique resource. For instance, many developing nations took a strong position at WARC-79 to allocate high frequency (HF) radio bands (HF radio) for fixed services that they need in order to develop basic domestic telephone and other services. While not reliable, HF radio is relatively inexpensive and easy to establish. The United States uses microwave frequencies domestically and has replaced most of its HF radio with more reliable satellite and submarine cable circuits for international telephone and other services. Therefore, the U.S. position at WARC-79 was to use HF radiofrequencies for international broadcasting, mobile services, and other growing services important to the United States, but not the services of comparable interest to many of the developing countries. It should be noted however, that developing countries are taking an increasing interest in international broadcasting and exercised a key role in decisions affecting this service in the HF radio bands.

A current and particularly important issue that serves to illustrate a difference in basic principle between the United States and the Third World concerns the geostationary satellite orbit. The Third World countries have expressed concern that the developed countries may proceed to launch satellites until the capacity of the orbit is used-up before the developing countries are able to use it. To protect against this eventuality, the Third World advocates a principle of distribution of orbit locations among nations under an a priori allotment approach. They believe such an approach would guarantee them future access since it would allocate orbit locations on a preplanned, negotiated basis. The

United States, on the other hand, has immediate needs and regards such an a priori allotment as wasteful and undesirable. Under the present ITU approach, the United States as well as other nations, can take account of the advances in technology and operating techniques to "engineer-in" the next satellite and fulfill requirements as necessary on an "as-needed" basis.

The differences among countries regarding the radio spectrum cover a broad range. Conflicts occur between nations no matter what the stage of development simply because nations are not uniform in their present use or future plans for this resource. Unlike most other nations, the United States places great emphasis on personal communication and private use of the spectrum (e.g., CB radios and mobile radio for private use, large number of amateur radio operators, etc.). The United States has global military commitments with diverse military spectrum requirements, a large concentration of scientific uses of spectrum including space research and radioastronomy. The United States is also a major exporter of telecommunication equipment.

Under international regulations, countries need not coordinate frequency use unless there is a potential of interference with another country. In other words, those domestic radio operations that do not send signals across national boundaries that could cause interference are not of international concern. A TV broadcast station in the middle of the United States does not require coordination with any other country. However, a TV broadcast station close to the U.S.-Canadian border requires coordination because its signal crosses into Canada. This geographical proximity of two countries gives rise to many potential conflicts that require resolution. The United States and Canada and the United States and Mexico have a continuing need to coordinate use of the radio spectrum.

There is considerable flexibility in the international radio regulations for countries to use the radio spectrum independently for different services. However, there are mitigating factors, like the need to coordinate use at border areas between countries that argue for uniformity in use. This doesn't mean that the coordinating problems go away, but only that they become more manageable. Other factors like producing, selling, and operating radio equipment in different world markets provide incentives for uniform and sometimes nonuniform technical and operating standards. Certainly there must be a certain measure of uniformity or international communications could not occur between countries. Indeed, many services are global in nature requiring international agreement for spectrum allocation and protection against interference. Such services include aeronautical, maritime, and satellite services. An airplane making flights internationally must be able to navigate and communicate as it flies in different parts of the world. The International Telecommunication Satellite Organization (INTELSAT) global satellite system with 106 member countries is an example of an international common-user system that requires uniform radio spectrum allocations. Thus, the necessity to reach agreements and coordinate spectrum use among nations goes far beyond the basic need to avoid radio interference.

Why Is It Necessary To Coordinate Radiofrequency Use Internationally?

Electromagnetic radio waves behave differently depending on the particular part of the spectrum or frequency range being used. Many factors determine the behavior of particular frequencies. Whether or not interference will occur depends on many factors in addition to the particular frequencies used. The transmitter power, type of receiver, and geographical separation between receivers, and type of terrain over which the signal travels are examples. The Earth's atmosphere has different effects on different parts of the radio spectrum. Different layers of the ionosphere reflect or absorb radio energy differently depending on the frequencies used, time of day, time of year, and period of the sunspot cycle. Frequencies lower in the spectrum tend to travel or propagate along the ground and follow the curvature of the Earth. This so-called "groundwave" becomes less important as the frequency range increases and the "skywave" or reflections from the ionosphere become more important. To achieve effective communications, one must choose frequencies from the band whose propagation characteristics are best suited for the intended use.

Using today's technology, most of the world's radio communication systems operate at frequencies between 10 kHz and 40 GHz (between 10,000 and 40 billion cycles per second). Over this range of frequencies, some 40 different radio services are internationally allocated certain segments or "bands of frequencies" within which to operate. For example, AM radio broadcast stations operate in the so-called medium frequency (MF) part of the spectrum (300 kHz to about 3 MHz) and are allocated the band 535 to 1,605 kHz. An individual AM station located in the United States is assigned a specific center frequency and a 10-kHz bandwidth by the Federal Communications Commission (FCC). Since the geographical area of coverage of an AM station is determined in part by the power of the transmitter, FCC limits the amount of power stations can use. Different classes of AM stations are authorized different power limits and thus have different coverage areas. Through such domestic regulatory decisions, FCC can increase or decrease the number of station assignments available in the United States independent of international decisions. However, international decisons bear directly on domestic issues in several ways. For example, WARC-79 decided to increase the amount of radio spectrum available for AM broadcasting by extending the frequency range to 1,705 kHz. While the United States had proposed to expand allocations to the broadcasting service, the conference results were not the same as the U.S. proposal. In any event, new AM radio receivers will need to be manufactured to receive this extended range of frequencies, and the future result will be more AM radio stations. Recently, the issue of reducing the channel spacing used by AM stations from 10- to 9-kHz spacing has been a subject of attention both within the United States and internationally. It appears that the U.S. position will be to maintain the 10-kHz channel spacing.

There are many examples to illustrate the complexities of spectrum management and policymaking regarding use of the radio spectrum. Almost any decision regarding radio spectrum and satellite orbit availability has many and varied consequences within the United States and internationally. Chapter 4 of this report discusses some of the major decisions negotiated at WARC-79 and their possible consequences for the United States.

How Is the Radiofrequency Spectrum Managed in the United States?

Government policymaking and spectrum management responsibilities are divided. Congress enacted the Communications Act of 1934, which created the FCC and gave it responsibility and authority to regulate nongovernment telecommunications. This includes spectrum management and the licensing of radio facilities except those operated by the Federal Government. The 1934 act gave the President responsibility and authority over spectrum management matters and operation of radio facilities of the Federal Government—both civil and military. The management of Government use of the spectrum has been delegated by the President to the National Telecommunications and Information Administration (NTIA) in the Department of Commerce, aided by the Interdepartment Radio Advisory Committee (IRAC). IRAC consists of representatives of the major Government agencies making use of the spectrum and includes a liaison representative from FCC.

The Department of State, consistent with its responsibilities for U.S. foreign policy, performs a central role in U.S. preparations for and participation at international conferences concerning the radiofrequency spectrum. The Department of State heads U.S. delegations that negotiate with foreign governments at conferences called by ITU. Other bilateral or multilateral dealings with foreign countries about spectrum management matters come under the general province of the State Department.

Congress has both general and specific oversight responsibilities for these agencies and their conduct of spectrum management. Moreover, the U.S. Senate must give advice and consent to ratification before the President can sign international agreements that bind the United States in a treaty with other nations. The Final Acts of WARC-79 will form the international radio regulations that have treaty status and thus require Senate action.

The Federal Government is responsible for, and engaged in, many activities under the broad term of spectrum management. The Government function of evaluating needs and sorting priorities for access to the radio spectrum among the many competing and often conflicting interests within the United States is a complex process. The expanding telecommunication industry adds more and more participants and, to a lesser extent, public interest and single interest groups are entering the spectrum management process.

The radio spectrum is allocated, operational rules are set, and specific frequency assignments are made by two Federal agencies—NTIA and FCC. NTIA does it for the executive branch of the Federal Government and FCC does it for the private sector and for the State and local governments. Dealings with foreign countries about the radio spectrum, including negotiation at international conferences, are the responsibility of the Government. In addition to their role as spectrum manager, the agencies of the executive branch use more radio spectrum than any other single user. They have access to almost half of the radio spectrum allocated in the United States. Most of the allocated spectrum is available to both Federal Government and private and nongovernment users on a shared basis.

How Is the Radiofrequency Spectrum Managed Internationally?

The primary world forum for international cooperation and coordination for use of telecommunications of all kinds is ITU with 155 member nations. ITU acts as the world's clearinghouse for telecommunication matters, and members of the Union undertake a treaty relationship for use of the radiofrequency spectrum as a party to the International Telecommunication Convention and to the radio regulations.

ITU is one of several specialized agencies of the U.N. However, ITU long predates the U.N. itself. ITU, which was founded in 1865, joined with the International Radiotelegraph Convention signatories in 1932 to become ITU.

ITU does not have a permanent constitution, but rather operates under the International Telecommunication Convention that is revised periodically at ITU plenipotentiary conferences. While basic to every function of the Union, the convention is relatively brief. Details delineating ITU's activities and the responsibilities of membership are spelled out in four other documents known as the administrative regulations: the telegraph regulations, the telephone regulations, the radio regulations, and the additional radio regulations—each of which enjoys treaty status in its own right (the United States is not a party to the additional radio regulations that were ultimately surpressed by WARC-79 and will pass into history on January 1, 1982). WARC-79 was convened to revise the radio regulations. Although several world and regional specialized radio conferences were held in the interim, the last conference to consider the full range of radio regulations was held in 1959.

In the world arena, ITU is the focal point for spectrum management. Its role in telecommunications, however, is much broader than spectrum matters and includes technical standards, operating practices, accounting and rate issues, as well as matters relating to wire communications. Just as ITU's influence is broader than spectrum consideration, so are international influences on spectrum issues broader than ITU. Indeed, there are no less than a dozen international organizations concerned with telecommunication/information matters and they impact directly and indirectly on the issues of spectrum management, as illustrated later in this report. Such organizations include the Universal Postal Union; the World Intellectual Property Organization; the Intergovernmental Maritime Consultative Organization; the International Civil Aviation Organization; INTELSAT; the Intergovernmental Bureau for Informatics; the Inter American Telecommunication Conference; the Organization for Economic Cooperation and Development; the North Atlantic Treaty Organization; and other groups of the U.N. family, particularly UNESCO and the U.N. Committee on the Peaceful Uses of Outer Space with its Working Group on Direct Broadcasting Satellites.

Issues Addressed in the OTA Study

The OTA study examines broad aspects of spectrum management within the United States and internationally. The present Government structure and decisionmaking processes for spectrum management are reviewed. Possible changes and improvements to existing processes are discussed and alternative policymaking mechanisms are presented in the study.

A review of the WARC-79 conference and the major decisions taken are addressed in terms of possible consequences for the United States. The present and future roles of ITU are considered with a range of alternative approaches for future U.S. participation in ITU. The study discusses alternative strategies for dealing with current and future issues that will be raised at several important conferences within the next few years.

Chapter 3

Domestic and International Management of the Radiofrequency Spectrum

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Chapter 3

Domestic and International Management of the Radiofrequency Spectrum

From the earliest practical utilization of radio for ship-to-shore and ship-to-ship communications in the early 1900's it was apparent that international agreements were required to coordinate use of the electromagnetic spectrum and avoid interference. For full and effective use of radio communications there had to be common standards for equipment design and mutually consistent operating techniques. Most of all, there had to be agreement on ways to achieve interference-free, compatible use of the radiofrequency spectrum by radio systems whose radiated energy may overlap in various dimensions of space, time, frequency, and other characteristics of electromagnetic radiation.

Without such agreements radio communications would be chaotic. Mutual interference would make radio reception so unreliable as to be virtually useless. The history of spectrum management has been marked by increasingly complex mechanisms for the rational and economical exploitation of increasingly congested channels of communication. The success of these arrangements is a tribute to man's commonsense and ingenuity.

The Structure of Spectrum Management for the United States

Telecommunication is an essential element in the economic and social life of the United States and a vital factor in the effective functioning of virtually every department and agency of the Federal Government. Yet, despite the nationwide and worldwide importance of rapid, reliable, responsive telecommunications, the United States does not have a centralized means to oversee and coordinate national policy decisions.

There is no single U.S. Government organization responsible for overall frequency management, policies, and processes. Instead, there are several governmental organizations having key roles and responsibilities with the National Telecommunications and Information Administration (NTIA), the Federal Communications Commission (FCC), and the Department of State being the principal agencies. The procedures followed are both formal and informal, and there are an increasing number of diverse constituencies.

Spectrum management in the United States, including the development of policy, is divided, depending on whether the spectrum user is a Government or nongovernment entity. The Communications Act of 1934 assigns to the President the responsibility for management of the electromagnetic spectrum used by agencies and departments of the Federal Government. FCC is responsible for managing all nonfederal government use.

It is the status of the user, not the frequencies employed or the particular category of service, that determines whether the President (or his agent) or FCC has jurisdiction.

For example, spectrum use by the Department of Defense (DOD) and the individual military services is under the jurisdiction of the President, while spectrum use by common carriers such as AT&T and the Communications Satellite (COMSAT), by State and local governments, and by citizens and amateur radio operators, is the responsibility of FCC.

The Role of NTIA

Under Reorganization Plan No. 1 of 1977 and Executive Order No. 12046, of March 26, 1978, President Carter transferred his authority to assign frequencies to the Secretary of Commerce, who further delegated it to the Assistant Secretary of Commerce for Communications and Information (who is also the Administrator of NTIA).

Assisting the Administrator of NTIA is an advisory body called the Interdepartment Radio Advisory Committee (IRAC). IRAC has been in continuous existence since 1922, having been established even earlier than the Federal Radio Commission, which preceded the present FCC. It has performed essentially the same functions for the past 59 years, although the organization and structure of the executive branch, and the office, or department, or administration in which IRAC has been housed have been changed many times.

IRAC is made up of representatives of 20 Federal agencies and departments. FCC participates through a liaison representative appointed by FCC. The functions of IRAC include assisting NTIA in the development of the national table of frequency allocations, the assignment of frequencies to stations owned and operated by the U.S. Government, and in the development and carrying out of basic policies, procedures, programs, and technical matters pertaining to the management and employment of the radiofrequency spectrum.

IRAC has a secretariat that provides general support to all committee activities and a variety of specialized subcommittees and ad hoc or special working groups to deal with particular matters, such as frequency assignments, international notification, and preparations for international conferences. The subcommittees are concerned with ongoing activities whereas ad hoc groups deal with specific-term subject matter.

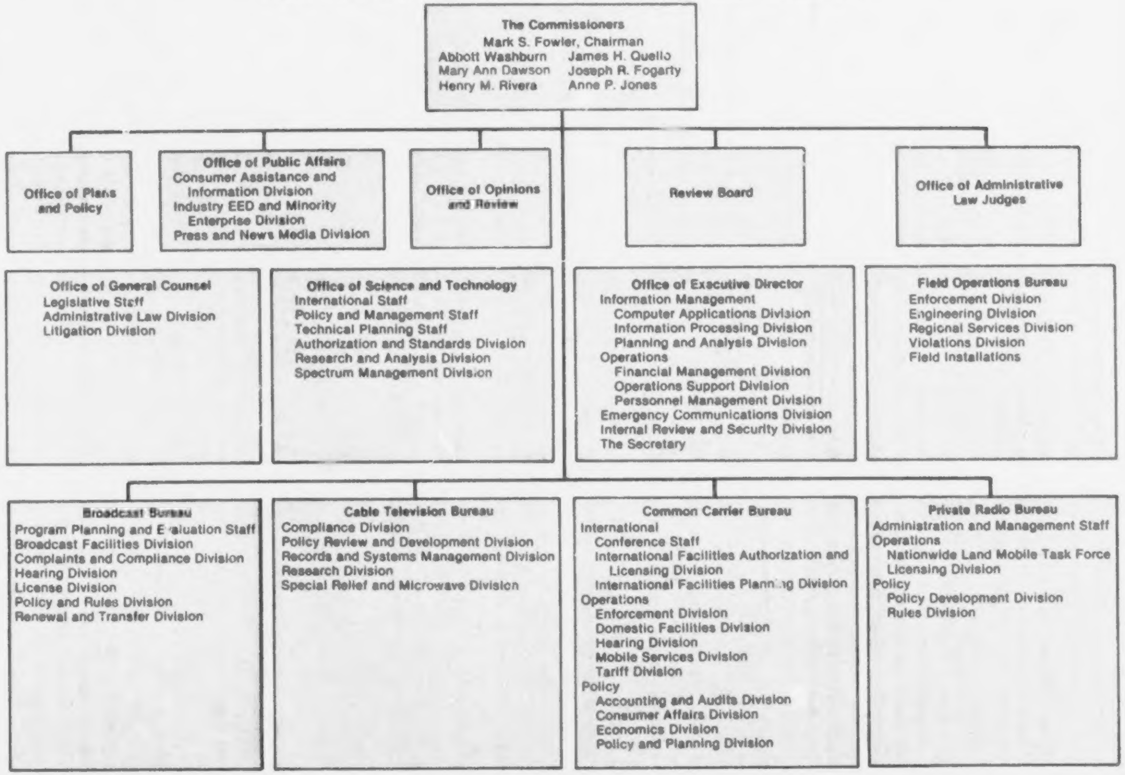
The Role of the FCC

As noted earlier, FCC, which is an independent Federal agency reporting directly to Congress, is charged with regulating interstate and foreign communications by means of radio, wire, and cable. This charter encompasses both economic regulation and the management and licensing of users of the radio spectrum.

The seven commissioners of FCC are appointed by the President with the advice and consent of the Senate. They supervise all FCC activities, with delegation of responsibilities to boards and committees of commissioners, individual commissioners, and staff units. The commissioners are aided by a staff of some 2,000 regular employees, about a fourth of whom are engaged in field operations (see fig. 1).

There are five operating bureaus, reflecting the functional basis of FCC: broadcast,

Figure 1.—Federal Communications Commission Structure—August 1981


The Commissioners
Mark S. Fowler, Chairman
Abbott Washburn
James H. Quello
Mary Ann Dawson
Joseph R. Fogarty
Henry M. Rivera
Anne P. Jones
Office of Plans and Policy
Office of Public Affairs
Consumer Assistance and Information Division
Industry EED and Minority Enterprise Division
Press and News Media Division
Office of Opinions and Review
Review Board
Office of Administrative Law Judges
Office of General Counsel
Legislative Staff
Administrative Law Division
Litigation Division
Office of Science and Technology
International Staff
Policy and Management Staff
Technical Planning Staff
Authorization and Standards Division
Research and Analysis Division
Spectrum Management Division
Office of Executive Director
Information Management
Computer Applications Division
Information Processing Division
Planning and Analysis Division
Operations
Financial Management Division
Operations Support Division
Perssonnel Management Division
Emergency Communications Division
Internal Review and Security Division
The Secretary
Field Operations Bureau
Enforcement Division
Engineering Division
Regional Services Division
Violations Division
Field Installations
Broadcast Bureau
Program Planning and Evaluation Staff
Broadcast Facilities Division
Complaints and Compliance Division
Hearing Division
License Division
Policy and Rules Division
Renewal and Transfer Division
Cable Television Bureau
Compliance Division
Policy Review and Development Division
Records and Systems Management Division
Research Division
Special Relief and Microwave Division
Common Carrier Bureau
International
Conference Staff
International Facilities Authorization and Licensing Division
International Facilities Planning Division
Operations
Enforcement Division
Domestic Facilities Division
Hearing Division
Mobile Services Division
Tariff Division
Policy
Accounting and Audits Division
Consumer Affairs Division
Economics Division
Policy and Planning Division
Private Radio Bureau
Administration and Management Staff
Operations
Nationwide Land Mobile Task Force
Licensing Division
Policy
Policy Development Division
Rules Division

SOURCE: Federal Communications Commission.

cable television, common carrier, field operations, and private radio. In addition, there are six staff offices, including the Office of Science and Technology (OST), which is the focal point within the Commission for Spectrum Management, and the Office of Plans and Policy (OPP).

Broad policy questions, having some spectrum management or frequency allocation aspects (e.g., the use and status of the ultrahigh frequency (UHF) portion of the spectrum or the investigation of interim provisions for broadcasting satellites, often referred to as direct broadcasting satellites) have been the subject of studies by OPP.

The primary focus for domestic spectrum management at FCC is in the spectrum management division within OST. This division, which is responsible for, among other things, the National Table of Frequency Allocations, obtains the views of the public (and corporate representatives) through publication of notices of inquiry (NOIs), advisory committees, and from the bureaus responsible for the several radio services. The table is amended after coordination with IRAC where necessary and issuance of notices of proposed rulemaking (NPRMs) (see fig. 2).

Once a frequency band has been allocated to a particular radio service, the bureau responsible for that service will develop rules for its use on the basis of information gathered through NOIs, NPRMs, and other FCC procedures.

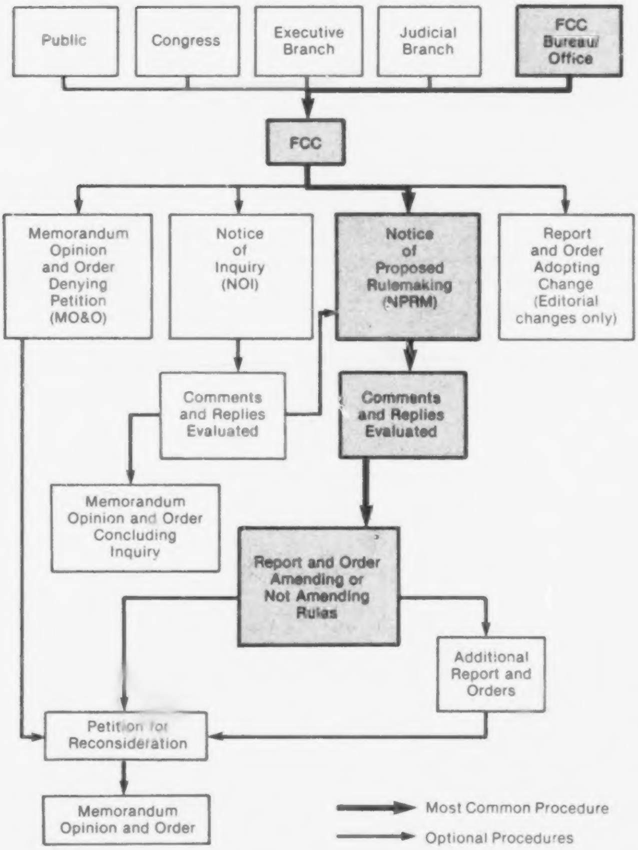
Spectrum management matters before international organizations (for example, proposals of the United States for changes to ITU radio regulations) are the responsibility of OST. This office works closely with the operating bureaus and other offices in FCC concerned with spectrum management matters. Moreover, the FCC liaison representative to IRAC is from OST. FCC's views and policies regarding its responsibilities for the private sector use of the spectrum are reflected within IRAC by this representative.

The Department of State's Role

It can be seen that policy for international telecommunication, including the orderly use of the radiofrequency spectrum, cannot be considered the exclusive concern of any single executive department or agency of the Federal Government. Nevertheless, telecommunications negotiations and agreements, both bilateral and multilateral, remain an important part of the foreign relations of the United States and therefore fall within the jurisdiction and responsibility of the State Department.

The Department of State, with recommendations from NTIA, FCC, and others, names delegations to international telecommunication meetings, whether sponsored by international organizations, such as the International Telecommunications Union (ITU) (and its permanent bodies, the International Radio Consultative Committee (CCIR), the International Telegraph and Telephone Consultative Committee (CCITT), and the International Frequency Registration Board (IFRB), or by regional bodies, such as the Inter-American Telecommunications Conference (CITEL) of the Organization of American States. The State Department can designate another agency or commission to represent the United States at a particular meeting or for a specified purpose. Thus, for example, FCC has been designated as the organization that transmits notifications and advance publication information required by the radio regulations to IFRB of ITU. Similarly, the Commission conducts bilateral meetings with Canada regarding nongovernment frequency use near the border, and DOD participates directly in the communications negotiations of the North Atlantic

Figure 2.—Actors Involved in FCC Rulemaking


Public
Congress
Executive Branch
Judicial Branch
FCC Bureau/ Office
FCC
Memorandum Opinion and Order Denying Petition (MO&O)
Notice of Inquiry (NOI)
Notice of Proposed Rulemaking (NPRM)
Report and Order Adopting Change (Editorial changes only)
Comments and Replies Evaluated
Comments and Replies Evaluated
Memorandum Opinion and Order Concluding Inquiry
Report and Order Amending or Not Amending Rules
Additional Report and Orders
Petition for Reconsideration
Memorandum Opinion and Order
Most Common Procedure
Optional Procedures

SOURCE: *FCC Communicator*, September 1975

Treaty Organization (NATO) and its subordinate bodies, such as the Allied Radio Frequency Agency.

Typically, U.S. delegations to international meetings in general, and ITU and its bodies in particular, have included individuals from Government agencies, and nongovernment organizations. As in the case of other specialized, highly technical international conferences and negotiations (meteorology, world health, agriculture, etc.) the State Department looks to other Government agencies, private sector organizations and companies, and individuals having knowledge of each field. In the case of international telecommunications, the State Department relies heavily on FCC, NTIA, and the national committees for CCIR and CCITT, as well as on individual agencies such as DOD, the National Aeronautics and Space Administration (NASA), and the Department of Transportation, as well as experts from the private sectors.

The Public Role

The Department of State may establish an advisory committee for specific conferences, as it did in the case of WARC-79. The public, including representatives of industrial groups and organizations, participate as individual members of such a State Department body. The public, industry, and private interests may participate in the decisionmaking process by filing comments and views with FCC through its public NOIs and NPRMs and in Government/industry advisory committees set up by FCC prior to many of the individual conferences. This public process to decide spectrum issues for the nonfederal government use of the spectrum is in contrast to the NTIA/IRAC nonpublic process to decide Federal use of the spectrum. Finally, individuals from industrial, scientific, research, manufacturing, and public interest organizations may be appointed to the U.S. delegations to such meetings.

U.S. international communication policy must reflect a coordinated balance of foreign and domestic policy considerations. Moreover, effective negotiations in the telecommunications field, including spectrum coordination, requires a combination of U.S. policymaking authority embodying essential features not easily combined. For example, there must be cooperation among mission-oriented Federal departments and agencies, extensive public and congressional participation, continuity over the years, and an overall sense of direction and purpose.

Past Critiques of U.S. Telecommunication Policymaking

These elements have not always been successfully brought together. A Communication Policy Board reporting to President Harry S Truman in 1951 identified five specific issues as being basic to the Nation's telecommunication problems. These were:

1. How shall the United States formulate policies and plans for guidance in reconciling the conflicting interests and needs of Government and private users of the spectrum space—that is, for guidance in making the best use of its share of the total spectrum?
2. How shall the United States meet the recurrent problem of managing its total telecommunications resources to meet the changing demands of national security?
3. How shall the United States develop a national policy and position for dealing with other nations in seeking international telecommunications agreements?
4. How shall the United States develop policies and plans to foster the soundness and vigor of its telecommunications agreements?
5. How shall the United States Government strengthen its organization to cope with the four issues stated above?

The policy board report emphasized spectrum usage, national security, and the maintenance of a sound industry as key subjects to be borne in mind when considering the issues quoted above. With regard to "international agreements," the same report stated:*

> Just as the United States has no clear policy for dividing its share of spectrum space, so it has lacked satisfactory means of determining policy as a basis for negotiations with other nations for the world division of the spectrum. The United States, in preparing positions for international negotiations, has in effect asked Federal and other claimants to state their needs, and then presented the total as the United States requirement. In those portions of the spectrum where these totals have been small enough to fit within the world complement, our delegations to conferences have had a negotiable position. In some cases, however, the total stated requirements have exceeded not merely those which could reasonably be put forward as the proper United States share, but have actually exceeded the total physical content of the bands. Furthermore, there is no permanent mechanism by which the stated requirements of the United States users could be adjusted with equity and safety. The imperative need for means of making such adjustments hardly requires elaboration.

Sixteen years later in 1967, President Lyndon B. Johnson sent a message to Congress advising that a "Task Force on Communication Policy" was being established to examine a number of major questions in the communications policy area. While most of the thrust of the task force was aimed at the use of satellite and space technology, it was apparent that the problems identified in 1951 by President's Truman's Policy Board remained unresolved.

In chapter 9 of its report—entitled "The Roles of the Federal Government in Telecommunications," the task force stated:**

> A. Traditionally, government has viewed telecommunications primarily as a mission-support function, rather than a focus for public policy. The result has been that policy has evolved as a patchwork of limited, largely ad hoc responses to specific issues, rather than a cohesive framework for planning. Government organization for the formulation and implementation of communications policies reflects this evolution.
>   - Early government involvement in telecommunications often involved ad hoc responses to individual problems as they appeared.
>   - The framework established by the Communications Act of 1934, although combining the broadcasting and common carrier regulatory functions, remains limited in scope.
>   - The post World War II period has been characterized by the growth of communications activities and a series of narrowly focused studies and limited organizational changes.
>
> B. The patchwork nature of the present structure is not conducive to optimum performance of the telecommunications activities and requirements of the Federal Government.
>   - Existing organizational arrangements make effective spectrum management difficult.
>   - The absence of a central focus possessing the requisite technological and economic skills makes more difficult the development of a sound and forward-looking international telecommunications policy.
>   - The policy coordination necessitated by the plethora of government telecommunications roles is inadequately performed by a multiplicity of committees.
>   - Recent events have underscored the lack of an effective government capability for long-range telecommunications policy planning.

Thus, the 1968 report reiterates the issues raised earlier by President Truman's Communications Policy Board, and the reiteration is particularly applicable in the areas of Government organization and spectrum management. In January 1980, the U.S. Senate Committee on Commerce, Science, and Transportation requested the Chairman of the Office of Technology Assessment

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*See *Telecommunications—A Program For Progress*, a report by the President's Communications Policy Board, dated March 1951, Irvin Stewart, Chairman.

**See *Final Report of the President's Task Force on Communications Policy*, Dec. 7, 1968.

Board to address the following two questions:*

(1) In view of the original United States positions, what will be the probable impact of the decisions made at WARC-79 on the U.S.? How should the U.S. adjust its preparation and participation in future international telecommunications conferences in order to more effectively accomplish its objective?

(2) Should the United States modify its allocations procedures and tables in order to respond to the WARC-79 decisions? What are the major U.S. spectrum needs likely to be during the next twenty years and how will they be accommodated?

The request reflects a continued concern for the existing machinery and procedures for U.S. telecommunications policymaking and preparation for international telecommunications conferences. Similar expressions of concern in the past did lead to structural changes but with little apparent result. President Eisenhower eliminated the office of the "Telecommunications Advisor to the President" and replaced it with an "Assistant Director for Telecommunications" in the Office of the Director of Defense Mobilization. The duties assigned were focused on telecommunications policies and standards for the executive branch and the President's responsibilities for spectrum management.

Over the years, the job of "Assistant Director for Telecommunications Management" became, in 1970, the Director of the Office of Telecommunications Policy and then, in 1978, the entire telecommunications function was transferred out of the Executive Office of the President to the Department of Commerce (DOC) where the present NTIA is now located.

In the final analysis, one may conclude that, despite its worrisome deficiencies, the U.S. telecommunications policymaking and management machinery has worked. How well, and how efficiently, are matters of dispute. The good results rest on the fact that over the years highly dedicated, competent, career personnel made the system work. Since spectrum is the common denominator in all uses of radio, coordination has been essential for the various radio services to function in a compatible manner. It is this coordination, which over the years has become a very specialized and sophisticated function, that frequently bears directly on the policy decisions. The United States has been extremely fortunate in that, in the past, it has been able to send to international conferences representatives who were experienced and competent to deal with what have been essentially technical rather than political and economic matters.

Prospects for the Future

But today, more than ever, telecommunications encompasses far more than just spectrum management, and U.S. policy formulation in advance of international negotiations involves more than just those issues forced by the need for frequency coordination. The existing U.S. structure is inadequate in that the permanent, ongoing spectrum management mechanisms are not adequately equipped to review all stated requirements of Government and nongovernment spectrum users and objectively verify and adjust needs consistent with national policy objectives. There is no ongoing effective means of collecting data and developing guidelines to judge the merits of one spectrum use over any other.

In an international negotiating environment that has become increasingly political, U.S. spectrum management specialists have been called on to anticipate U.S. telecommunications requirements far into the future without adequate long-range analysis. The absence of such a strategic, long-term planning approach reflects the absence of concern for telecommunications issues at the highest levels of Government and hampers the effectiveness of U.S. negotiators.

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*See joint letter signed by Senators Cannon, Packwood, Hollings, Goldwater, and Schmitt to the Hon. Morris K. Udall, Chairman, Office of Technology Assessment, dated Feb. 11, 1980.

Lack of high-level concern has also led to a shortage of trained and experienced engineering personnel to replace those retiring from Federal Government service. Nor has there been sufficient awareness of the need for personnel with supplementary economic, legal, and diplomatic skills, as well as foreign language proficiency.

The three principal players in conducting telecommunication negotiations are the Department of State, DOC (through NTIA), and FCC. Thus, within the executive branch there is a built-in fragmentation of telecommunications policy. The Department of State is clearly the focal point for the conduct of foreign relations but its Office of International Communications Policy is lightly manned and well down in the State Department's organizational structure. It is not in a strong position to make its influence felt in the upper echelons of Government and industry.

Under Executive Order No. 12046, NTIA is assigned functions that include developing and setting forth, in coordination with the Secretary of State and other interested agencies, plans and programs that relate to international telecommunications. From a practical standpoint, NTIA lacks sufficient resources and "clout" to fully carry out its mandate effectively. Moreover, the rather general wording of the Executive order leaves it ambiguous as to how far NTIA can go in its coordinating role, particularly when that mandate risks encroachment on the general regulatory responsibilities of FCC.

In his testimony before the Subcommittee on International Operations of the House Foreign Affairs Committee on July 31, 1980, Glenn O. Robinson, who was chairman of the U.S. delegation to the 1979 WARC, said he did not regard the fragmentation of U.S. policymaking to be a matter of great significance in preparing for future WARCs. Yet he went on to say:

> Of course, it is necessary to have some locus of final decision making; there must be some place, where in Truman's words, the "buck stops." So far as international policy is concerned the answer seems reasonably clear: the Secretary of State speaking for the President has, and must retain, the ultimate responsibility.
>
> The State Department's role extends beyond mere final review and approval of international policy positions. It also has a role to play in shaping policy positions—to ensure that international policy concerns are properly integrated into the policy making process from its inception and not merely layered on top of it at the point of final decision.
>
> An important element of future preparation will be developing appropriate linkages with other elements of international communications policy. Obviously radio spectrum use and management does not stand apart from other aspects of international communications and communications policy. Despite the highly specialized technical character of radio spectrum management which sets it apart from, say, U.N. or UNESCO debates over free-versus-balanced-flow of information or development assistance programs, the issues are often related.
>
> As a first step some permanent mechanism for intra-Departmental and interagency coordination is appropriate. Such a mechanism was developed in 1978 as a first attempt to bring together some of the major strands of international communications policy. Thereafter coordination was pursued more or less informally as part of the WARC-79 preparations. For the future, however, policy review and development ought not to be dominated by some specific major event such as WARC. The "big event" is probably of diminishing importance in international diplomacy. The process of continuing negotiations through a series of conferences has become predominant in almost all aspects of international affairs, including international communications policy. It follows that too great an emphasis on single

events, such as future WARCs, as a focal point for policy coordination could lead to a distorted perspective on policy issues and objectives.

As to what organizational structure might be needed to carry out the future role of coordinating international communications policy I have no specific recommendations. I do not think a large new office is required to handle the task, but the responsibility must be clearly recognized and given stature commensurate with its high importance.

Thus, the expressions of concern over the lack of permanent mechanisms for coordinating U.S. international communication policy persist to the present time. The present structure is not adequate to develop telecommunication policies, to effect long-range planning, and assure the achievement of U.S. goals.

International Management of the Spectrum – the ITU

ITU is the principal international institution for achieving agreement and cooperation among nations on the use of telecommunications. It is a unique organization that has managed to bring the merits of technical collaboration to a level where participating governments feel a vested interest in the agreements reached.

Adherence to ITU agreements is voluntary and cannot be enforced by higher authority. There are no sanctions to compel an ITU member to abide by ITU rules. However, membership in ITU entails a treaty obligation to conform to the collective decisions of its members. Its activities might be described by systems analysts as a nonzero or positive-sum game in which there are no winners or losers and where all the participants benefit. The mechanisms of ITU are designed to achieve the maximum utilization of the electromagnetic spectrum by the widest range of users, and to avoid a situation where one user is accommodated at the expense of another.

ITU was created in 1932 by the merger of two existing groups—the International Telegraph Union (founded in 1865) and the International Radiotelegraph Convention signatories. It has grown in breadth and scope over the years—surviving two world wars and the unprecedented diversification of communications technology.

An international agreement-making and rulemaking organization whose members adhere to many varied legal systems, it has avoided legal doctrine. Its fundamental governing principles are contained in the ITU Convention, a constitution first adopted in 1932 that remains subject to periodic revision. According to this convention the purposes of ITU are:

1. to maintain and extend international cooperation for the improvement and rational use of telecommunications of all kinds;
2. to promote the development of technical facilities and their most efficient operation with a view to improving the efficiency of telecommunications services, increasing their usefulness and making them, so far as possible, generally available to the public; and
3. to harmonize the actions of nations in the attainment of those ends.

The activities of ITU are organized for the attainment of specific objectives, the most important of which are:

- allocation, registration, and coordinated utilization of the radiofrequency spectrum to avoid harmful interference between radio stations of different countries;

- planned development of telecommunications facilities, particularly those using space techniques. Creating, developing, and improving telecommunication equipment and networks in developing countries;
- promoting collaboration in setting telecommunication rates as low as possible, while maintaining efficiency of services and independent financial administration; and
- conducting studies, collecting and publishing public information, adopting resolutions, and formulating regulations on matters relating to telecommunications.

ITU Structure

The ITU structure combines conferences, or policymaking bodies, and permanent organs. The plenipotentiary conference is the supreme body of ITU. It consists of the delegations of member countries meeting every 5 to 9 years to formulate general policies, establish budget guidelines, elect members and top officials, and conclude agreements between the ITU and other international organizations. Only the plenipotentiary conference can amend or revise the ITU Convention. The next such conference is scheduled for September 1982 in Nairobi, Kenya (see fig. 3).

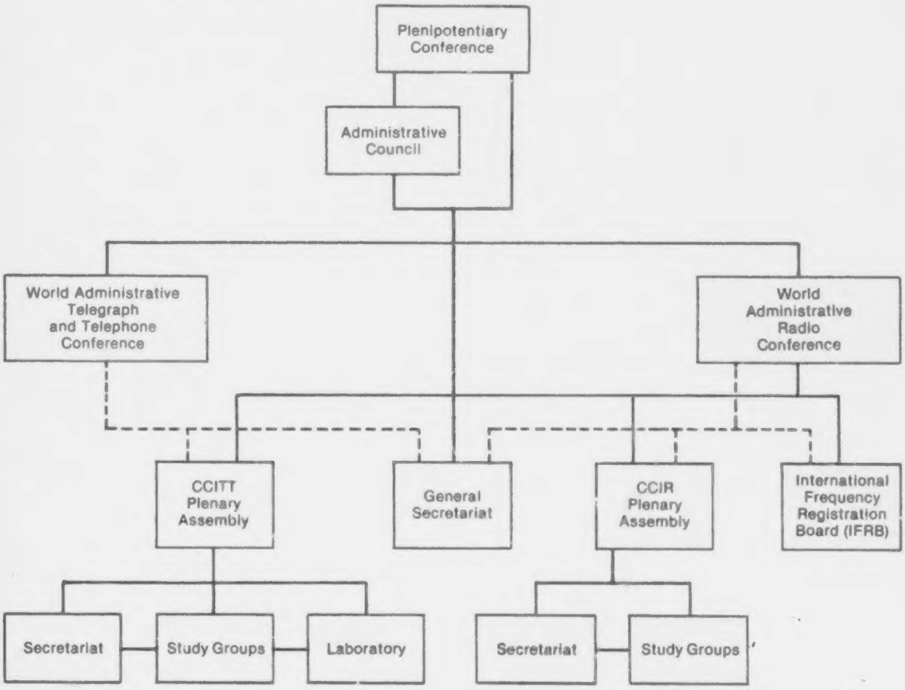
Administrative conferences are convened to consider specific telecommunication matters as the need arises. They may be either worldwide or regional in scope and participation. (ITU divides the world into three regions—region 1 covers Europe, the U.S.S.R., Turkey, Mongolia, and Africa; region 2 covers North, Central, and South Americas, the Caribbean and Greenland; region 3 covers South Asia, Australia, New Zealand, and the Pacific.) Conference agendas may concern all radio communications services and all frequency bands or may be restricted to a particular band and one or more services. Among the administrative conferences held in the 1970's were those dealing with space, maritime and aeronautical radio communications, satellite broadcasting, and WARC-79. The Final Acts of such conferences become treaties following ratification by ITU members.

In the intervals between plenipotentiary conferences, the administrative council acts on behalf of the entire membership in formulating policy and overseeing the work of ITU. First instituted in 1947 with 18 members (ITU then had 73 member states and an annual budget of 4 million Swiss francs), the council now has 36 members. (ITU has grown to 155 members and has a budget of 67 million Swiss francs, or approximately $31 million). Meeting each spring in Geneva, the council approves the annual budget, determines the size and grading of the staff, sets salaries and allowances, and determines the schedule of conferences and meetings and their agendas. It has become a forum for discussion of certain political issues such as the question of South Africa, Rhodesia, the Portuguese colonies in Africa, and the Middle East.

The council has also contended with the issue of the languages to be provided in interpretation and document translation at conferences. Interpretation and translation are provided in French, English, and Spanish, plus Chinese and Russian for all official documentation. In addition, there is interpretation in Arabic at plenipotentiary and administrative conferences.

The general secretariat has grown in size and responsibilities over recent years. Since 1965, the Secretary General of ITU has been chosen from among candidates from developing countries. The present Secretary Gen-

Figure 3.—Organizational Chart of ITU


Plenipotentiary Conference
Administrative Council
World Administrative Telegraph and Telephone Conference
World Administrative Radio Conference
CCITT Plenary Assembly
General Secretariat
CCIR Plenary Assembly
International Frequency Registration Board (IFRB)
Secretariat
Study Groups
Laboratory
Secretariat
Study Groups

SOURCE: International Telecommunication Union

eral, Mohammed Mili of Tunisia, assisted by his deputy, Richard Butler of Australia, coordinates and supervises the day-to-day activities of ITU. He employs a multinational general secretariat staff to support the other permanent organs of ITU—IFRB and the two technical committees: CCIR and CCITT. The secretariat includes a technical cooperation department that assists developing countries, using funds provided by the United Nations Development Program (UNDP). (The current members of IFRB are from the U.S.S.R, Canada, Morocco, Japan, and the United Kingdom.)

Unlike other international organizations in which sole executive direction resides in a secretary general, there is a diffusion of authority among ITU's permanent organs leading to what is sometimes described as ITU's "Federal structure." No one element of ITU's secretariat has overall responsibility for the operation of ITU. The Secretary General cannot dictate the registration of frequencies by IFRB nor does he have technical responsibilities for the activities of the International Consultative Committees (CCIs). Also, IFRB cannot dictate the technical findings of CCIs. Nevertheless, the Secretary General, IFRB, and CCIs are required to work together to meet the needs of the members. This sharing of executive power has given rise to certain conflicts and rivalries.

Led by five officials elected by the plenipotentiary conference, IFRB records the date, purpose, and technical characteristics of frequency assignments by member countries with a view to achieving international recognition. IFRB also records orbital positions assigned to geostationary satellites. It examines each frequency notification received for conformity with the international radio regulations and for the possibility of harmful interference. If the examination is favorable, the frequency assignment is entered in the master register; if not, it is returned to the notifying country with suggestions regarding a solution to the difficulty. Through reference to the master register and the board's weekly circulars, operators worldwide have access to a listing of all registered frequency assignments.

CCIR, which is currently headed by an American, and CCITT, whose director is French, are ITU's best known permanent organs. All member countries and certain private operating companies, scientific and industrial organizations can participate in their work. The ITU Convention prescribes the duties of CCIR as the study of technical and operating questions relating to radio communications and the issuing of recommendations. The CCITT members are to study and make recommendations regarding technical, operating, and tariff questions related to telegraphy and telephony.

The work of CCIs is conducted by a number of study groups whose members include experts in each of the specialized areas of interest to the study groups. The product of these study groups is the basis for standards and specifications that are generally accepted by all administrations and users.

In practice, CCIs have studied, issued reports on, and made recommendations concerning communication systems operations and advanced technologies as they have been developed. The member nations of ITU look to CCIs for information and guidance on the use of these techniques and their reports and recommendations are respected and generally accepted by member nations in the planning, design, and operation of telecommunication systems.

The responsibilities of ITU to lend assistance to developing countries and to study their special problems is a challenge to an organization whose principal purpose is agreement-making. The rationale is simple enough. For agreement-making to be effective, all participants must be in a position to participate and cooperate. The less developed countries need help in extending their telecommunications services and in developing appropriate administrative and technical skills. Thus, technical assistance promotes better global communications generally.

The challenge to ITU lies in extending this assistance without overtaxing its limited resources. The extraordinary growth of telecommunication technologies and services has already strained ITU's capacity to produce effective international agreements on a timely basis. Furthermore, ITU must compete with other organizations for the services of telecommunications specialists that it would like to assign to assist developing countries. The costs of ITU's administration of UNDP aid programs must be met by contributions from developed countries that may prefer to see ITU concentrate on its agreement-making functions.

Political Issues

At various times, member nations of ITU and signatories to the convention have been excluded from ITU conferences for political reasons. For example, this happened to Spain in 1947, and Rhodesia, South Africa, and Portugal were excluded from a 1973 conference. There have also been occasions when efforts to exclude nations have failed to win approval of the membership.

In other instances, the structure of ITU has been flexible and pragmatic enough to assign country codes for worldwide automatic telephone dialing to nations that, at the time, were not members of ITU (e.g., East Germany, the Peoples Republic of China).

Unfortunately, ITU is not always successful at agreement-making. For example, in the postwar years three incompatible standards for color TV broadcasting were adopted in several parts of the world to the obvious detriment of international coordination and standardization. As a result, European TV set manufacturers must provide parallel circuitry to accommodate the different standards and international program exchange is seriously burdened by the conversion of standards at switching points.

A similar problem developed in the search for a standardized digital transmission system. European countries were able to select a single system from among almost 20 competing designs but North American interests, committed financially to a different design, were unwilling or unable to be accommodating enough to find a compromise single standard.

Overall, the achievements of ITU are impressive considering its inherent weaknesses and the complexity of its structures and procedures. Modern states are clearly unwilling to cede substantial power to any international organization. Yet, ITU has managed to maintain order in an environment that could easily have been chaotic. The growing needs for maritime and aeronautical communications have been met. Efficient international telegraph and telephone service would have been difficult without ITU or similar organizations. Despite the strong economic interests of national equipment suppliers, there was sufficient collaboration within CCITT to accomplish the shift from operator-assisted international phone service to automatic dialing, routing, and switching.

The Future of ITU

Whether ITU can continue to function effectively in the future is another question. The influx of "new" nations to membership in ITU in recent years has brought a different set of values and concerns to the organization. The new members have brought a heightened demand for programs of aid and technical assistance to developing nations. They have fostered regionalism and, most important, they have increasingly demanded equitable access and usage of spectrum and orbital slots for geosynchronous satellites.

The needs of these developing nations are often at odds with those of the developed world. For example, industrialized countries need considerable amounts of radio spectrum to support sophisticated worldwide radionavigation and radiolocation systems considered vital to their national security and safe international air travel. Developing countries have limited need for these "radar" systems. By the same token, there is contention between the developed and less developed countries over the use of high frequency (HF) bands. The developing countries depend on HF for domestic point-to-point communication in large measure whereas the developed countries are more likely to use the same frequencies for international broadcasting, mobile, and other services.

The principal issue of contention has been the so-called "first-come, first-served" principle used by ITU member countries to register radiofrequency assignments. Basically, "first-come, first-served" has meant that whoever develops a use for a given frequency first and notifies IFRB of this intended use has established a claim to protection from harmful interference. This has meant that the bulk of the frequency assignments have been assigned to the developed countries. Moreover, some of those assignments, particularly those used for HF fixed (point-to-point) services, have been abandoned by the developed countries in favor of microwave and satellite systems but, it is charged, have not been given up for reassignment. (It should be pointed out that to a large degree the radio spectrum is reusable. This means that a frequency assignment made to one country does not necessarily preclude its use by another country.)

The developing countries, therefore, fear that when they are finally prepared to use radio services not needed at their present stage of development, the spectrum space will no longer be available. They have translated this fear into a demand for "equitable and/or guaranteed access" to the frequency spectrum. The developed countries have responded by insisting that the fears of the developing nations are groundless, that new technology will free up certain frequencies while allowing other frequencies to be shared by a greater number of stations and services. However, frequency-sharing usually requires more sophisticated and expensive equipment and increases the need and complexity of coordination to avoid interference. Most developing countries lack trained engineers sufficiently competent in frequency management to carry out complicated coordination procedures and also lack the required sophisticated and expensive equipment to avoid interference.

"Equitable access" also refers to communications satellites and the newer members of ITU frequently cite the 1967 U.N. Treaty on Outer Space that recognized the common interest of all nations, regardless of the degree of their economic or scientific development, in the uses of outer space and in the "nonappropriation" of outer space by any one nation. While each state has the right to the free and peaceful utilization of space, the treaty is viewed as implying a corresponding obligation of nations to avail themselves of these uses without prejudice to the interests of other nations.

Claims of the developing nations to "equitable access" were further underscored by Resolution No. Spa 2-1, adopted by the 1971 WARC (and included in the Final Acts of WARC-79), dealing with space telecommunications, which states:

> . . . *considering* that all countries have equal rights in the use of both the radio frequencies allocated to various space radio communication services and the geostationary satellite orbit for these services;
>
> . . . *taking into account* that the radio frequency spectrum and the geostationary satellite orbit are limited natural resources and should be most effectively and economically used;
>
> . . . *having in mind* that the use of the allocated frequency bands and fixed positions in the geostationary satellite orbit by individual countries or groups of countries can start at various dates depending on the requirements and readiness of technical facilities of countries;
>
> *Resolves*
>
> 1. That the registration with the ITU of frequency assignments for space radio communication services and their use should not provide any permanent priority for any individual country or groups of countries and should not create an obstacle to the establishment of space systems by other countries;
> 2. That, accordingly, a country or a group of countries having registered the ITU frequencies for their space radio communication services should take all practicable measures to realize the possibility of the use of new space systems by other countries or groups of countries so desiring;
> 3. That the provisions contained in paragraphs 1 and 2 of this resolution should be taken into account by the administrations and the permanent organs of the Union.

This 1971 position was reinforced at ITU's Malaga-Torremolinos Plenipotentiary Conference in 1973 that amended the ITU Convention to include article 33, which reads:

In using frequency bands for space radio services members shall bear in mind that radio frequencies and the geostationary satellite orbit are limited natural resources, that they must be used efficiently and economically so that countries or groups of countries may have equitable access to both in conformity with the provisions of the radio regulations according to their needs and the technical facilities at their disposal.

The Changing ITU Environment

It is clear that the developing countries have also succeeded in establishing a resource management philosophy designed to protect their interests. Although ITU may remain a viable institution, there have been some subtle and important changes in the institutional framework under which the technical functions and work of ITU are carried out. Moreover, WARC-79 clearly showed the power of the Third World as a political force in ITU. Although the collective objectives of the developing countries were limited, they were generally achieved.

The struggle for power between the developed and the less developed nations must be expected to continue at future ITU conferences. In the most basic sense, the developing countries derive power from their collective numbers via the "one-nation, one-vote" principle. The developed countries derive their power from their technical competence, know-how, and leadership. The developing countries' power can most easily and usefully be exploited in the ITU legislative forums; the developed nations' through the technical administrative organs.

The developed country strength lies in the permanent organs of ITU and the delegation of authority and work efforts within that structure. Control, in the sense of inclusion or exclusion of issues and agenda items, and in the handling of budgetary matters, is most easily exercised here. It is natural for the developing countries to seek to change these administrative organs to advance their own interests and objectives. The 1982 plenipotentiary meeting could well see a furthering of this effort.

The success of ITU, as noted earlier, has been due in large measure to the willingness of its members to adhere voluntarily to commonly arrived at agreements and regulations. There is no compulsion to comply, except common usage, custom, and a perceived stake in international order. The inherent flexibility granted ITU members has also enhanced its effectiveness. Subject to a vote of disapproval by fellow members, any nation may serve notice through a footnote that it intends to allocate a particular frequency to some usage beyond that specified by other countries, or to specify a usage as primary or secondary. A member country may also take a reservation indicating that it cannot protect a particular spectrum allocation approved by an ITU conference.

The common desire of most countries to minimize the number of footnotes and exceptions to the international table of allocations was not realized at WARC-79. Eighty-three statements, representing reservations, were included in the final protocol of the WARC-79 Final Acts. The United States took six reservations. The remaining 77 statements, some of which bear the names of several countries (up to 20, in one case), can be grouped in three categories: general reservations, political reservations, and specific reservations.

Thirty-five reservations were "general" in that they were intended to reserve a government's right to take whatever steps it considered necessary to protect its radio communication services should other ITU members fail to observe the radio regulations. Other reservations were "political" in that they related to territorial disputes or sovereignty claims that had little impact, if any, on the ITU or on spectrum use for radio communication purposes.

The remaining reservations of other countries were addressed to specific issues, principally the allocation of HF bands among the broadcasting, fixed, and mobile services. Some dealt with localized problems associated with UHF band use.

It would be going too far to say that the taking of numerous reservations at WARC-79 signaled a sharp decline in ITU effectiveness. But it should be noted that the reservations, when coupled with the widespread use of footnotes to denote unwillingness to protect a particular frequency allocation in a particular locale, resulted in degrading of the table of allocations and thus makes future coordination more difficult.

Throughout the 1970's, repeated efforts were made both within and outside ITU to assess the competing demands being made on the radio spectrum. In addition to the various CCIR study groups that addressed the growing requirements of different services, there was a CCIR plenary assembly in Kyoto, Japan and the CCIR interim working party (4/1) in Tokyo; both met in 1978, the latter being directed primarily toward fixed satellite service considerations. In October/November 1978, the WARC special preparatory meeting (SPM) was held in Geneva.

Among some Third World countries there was a feeling that SPM was dominated by the developed countries because of its technical nature, and therefore was to be treated with some suspicion. It was natural, then, that other preparatory meetings should take place outside the framework of these traditional ITU entities. One of these was a May 1979 gathering of the nonalined movement (NAM) in Yaounde. Two specific resolutions produced at this gathering called for a future satellite planning conference and specified working arrangements for WARC-79. The vice-chairman of this meeting was Dr. M. K. Rao of India, the country selected to coordinate satellite issues for NAM.

The NAM Yaounde meeting was a clear indication that these countries will be preparing for future conferences on a collective basis, seeking to make the most of their bloc voting strength.

There were only a few collective objectives sought by the Third World at WARC-79:

- control of the selection of the conference chairman;
- a large allocation of HF frequencies to the fixed service;
- satellite planning and HF broadcasting planning conferences;
- a bar to the encroachment of land mobile and other services into frequencies reserved for broadcasting at UHF in region 1; and
- continued technical assistance.

These goals were generally achieved with the exception of the first; after a week of disagreement, the conference had to settle for a compromise chairman from Argentina who was not a candidate of either the developed or less developed nations. Overall, WARC-79 did demonstrate the increasing influence of the Third World in ITU.

The results of the OTA-sponsored survey* shows that 74 percent of the U.S. delgates to WARC-79 and 67 percent of the nondelegates responding to the survey believe that the relative influence of the Third World countries at ITU conferences has increased greatly over the past 5 years. Another 23 percent of those responding believe there has been only a slight increase in the influence of the Third World countries. During the same time, 51 percent of the U.S. delegates and 59 percent of the nondelegates surveyed believe there has been some decrease in U.S. influence, though only 12 percent and 18 percent of the delegates and nondelegates, respectively, saw this as a major decrease. Looking ahead, the respondents see U.S. influence from now through 1985 remaining about the same (39 percent) or slightly decreasing (45 percent). Some increase in U.S. influence is foreseen by some respondents (14 percent), while a major decrease is foreseen by only a small number (2 percent).

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*The OTA-sponsored survey consisted of a questionnaire of 51 questions mailed to 169 individuals involved directly or indirectly with preparations for WARC-79, and/or with implementation of the results of WARC-79. A total of 110 questionnaires were completed and returned: 55 from U.S. delegates to WARC-79; 29 from nondelegate Government personnel; 18 from nondelegate members of the advisory committee to the U.S. delegation; 26 from nondelegate industry personnel; and 41 from nondelegate individuals in the private sector. In addition, 20 in-depth face-to-face interviews were conducted with 13 Government officials and 7 industry officials. The results of the survey and an analysis of the answers and information received through the survey and interviews are presented in the report prepared by Kappa Systems, Inc., under contract to OTA. The report can be found in app. A to this report.

The interests that guide many of the less developed countries in their approach to international telecommunications issues are quite different, and often hostile, to those of the United States. As traditional advocates of the free flow of information, the United States is opposed to prior censorship of either television or radio broadcasts. Therefore, the United States rejects the idea that any country should obtain prior consent before broadcasting a radio or TV signal to another country. The issue has not been raised for HF radio broadcasting because so many countries engage in international broadcasting. The added impact of television, however, has kept the issue of prior consent at the forefront of debate on international communications within the U.N. Educational, Scientific, and Cultural Organization (UNESCO) and the U.N. Committee on the Peaceful Uses of Outer Space (COPUOS).

Other International Organizations Involved in Telecommunications

U.S. national interests in telecommunications are interwoven with a broad range of specialized international organizations. In addition to ITU, they include, UNESCO, the U.N., the World Intellectual Property Organization (WIPO), the Universal Postal Union (UPU), the Intergovernmental Bureau of Informatics, the Intergovernmental Maritime Consultative Organization (IMCO), the International Civil Aviation Organization (ICAO), CITEL, and the Organization for Economic Cooperation and Development (OECD).

UNESCO's jurisdiction is extremely broad and the organization has taken an active interest in communications through the adoption of resolutions, by publishing studies, and by sponsoring and attending specialized seminars and conferences. It has participated at ITU conferences in an observer status, for example, in an effort to promote shortwave broadcasting as a means of furthering international peace and understanding.

More recently, UNESCO has become involved in studying the potential uses of direct broadcasting satellites and has adopted a set of norms regarding their use. Within the past few years, UNESCO's International Commission for the Study of Communication Problems (commonly known as the MacBride Commission because of its chairman Sean MacBride) has focused attention on the so-called "New World information order" and Third World complaints about the imbalance in news flowing in and out of less developed countries and the need to develop a communications infrastructure in the Third World.

U.N. involvement in communications issues has surfaced most prominently within COPUOS and the Working Group on Direct Broadcasting Satellites. COPUOS and its subcommittees on legal, scientific, and technical matters have been significant forums for the discussion of guidelines to govern the use of the geostationary orbit for radio communication. A conference on the peaceful uses of outer space is scheduled for 1982 and will consider and discuss means to resolve such issues as whether there need be prior consent obtained before one nation uses satellites in space to broadcast a signal which extends beyond its own borders into other countries. The United States opposes prior consent in principle. It is technically impossible to avoid some "spillover" when broadcasting to one's own country via space satellite. If prior consent were to be strictly enforced, it would be impossible for the United States to develop a domestic system for direct broadcasting by satellite without the prior consent of its neighbors (e.g., Cuba).

Increasingly, the United States finds itself at odds with Third World and other countries that seek to impose restrictions on the flow of information across national frontiers and on the information-gathering activities of journalists. The "New World information order" being demanded by many less developed nations within UNESCO appears to many in the United States to be adverse to commercial information gathering and dissemination that is not under tight government control.

WIPO administers a number of international conventions intended to protect the intellectual property rights of the authors of information that is stored, disseminated, or displayed through electronic systems. In recent years, WIPO and UNESCO have jointly sponsored working groups to study satellite program distribution, cable TV, and national copyright and patent legislation for developing countries.

UPU was established in 1874 and is the second oldest existing international organization. It has become embroiled in communications issues because of the rapid evolution of electronic information and communication systems, including "electronic mail." UPU is also involved in the controversial issue of the subsidization of costly mail delivery systems through high tariffs on electronic communication systems. This cross-subsidization, which is common among countries that have integrated government administration of postal, telephone, and telegraph systems, has impacted severely on transnational corporations heavily dependent on international communications.

The Intergovernmental Bureau for Informatics is a Rome-based organization, outside the U.N., which holds periodic conferences to consider broad policy and legal questions related to transborder data flows and related electronic information issues. It is influential among developing countries and its resolutions have wide impact.

IMCO has several components that consider telecommunications issues relating to maritime navigation and ICAO does the same with respect to air navigation. The most important regional organization in which the United States deals with communications matters is CITEL which seeks regional agreements and develops a consensus on common positions for Western Hemisphere countries prior to meetings of ITU. OECD, though largely oriented toward Europe, seeks to harmonize the differing views of all industrialized countries on such controversial communications issues as control of transborder data flows.

U.S. representation to these organizations comes from many levels of Government, both within and outside the Department of State. Within the department, two bureaus play major roles in the determination of international communications policy: the Bureau of International Organization Affairs and the Bureau of Economic and Business Affairs. Other State Department components that play ancillary roles are the Under Secretary for Security Assistance, Science and Technology, the policy planning staff, and the Legal Advisor's Office.

For 30 years there has been mounting concern in the United States over Government procedures for developing telecommunications negotiations. The absence of centralized management and policy coordination has frequently been noted and it would appear that the United States was fortunate to preserve its essential interests up to and through WARC-79. The question remains—will the procedures, mechanisms, and processes that gave a margin of success in the past continue to work in the future?

The United States spent approximately 5 years formulating the proposals and position papers for WARC-79. Some 800 people were involved in one way or another. It is estimated that the State Department alone spent about $1 million in preparing for WARC-79 and this amount does not include the expenses of other Government agencies involved, nor of private industry organizations. By its very nature, this was a complex and time-consuming process. With the large number of international telecommunications conferences and meetings scheduled for the 1980's and 1990's, it is clear that a more expeditious procedure for the preparation, coordination, and adoption of U.S. proposals and positions is needed.

U.S. Preparations for WARC-79

The 20-year period between the previous general World Administrative Radio Conference in 1959 and WARC-79 was one of vast change. The number of nations belonging to ITU almost doubled—from 87 to 155. There were tremendous advances in telecommunication technology, including the development of satellite communications. Worldwide demands for improved communications had greatly increased. As an added incentive to convene a general WARC, it was widely recognized that inconsistencies had developed in the general regulations having application to more than one of the individual radio services. The fact that a number of specialized radio conferences had been held since 1959 resulting in decisions not entirely consistent with each other also suggested the need for a comprehensive conference.

The United States expected WARC-79 to take place in a contentious atmosphere. The rising economic aspirations of the developing countries, coupled with their perceived requirements for a fair share of the radio spectrum and the geostationary satellite orbit made confrontation appear inevitable.

The decision of ITU in 1973 to follow U.N. General Assembly precedent and grant observer status to the Palestine Liberation Organization, and the rhetoric at the NAM conference in Havana immediately prior to WARC-79 generated further concern that telecommunication and spectrum issues were to be politicized.

As noted earlier, ITU, like the U.N. General Assembly, operates on the principle of "one-country, one-vote." The United States and other, large developed countries have no more voting power than Haiti or Vatican City. However, in practice, ITU attempts to resolve technical issues and reach decisions by consensus and reverts to voting only when a consensus cannot be obtained. Therefore, the United States embarked on an early effort to direct the focus of the conference to the major technical issues and away from extraneous political matters.

U.S. preparatory work for WARC-79 proceeded under the following broad guidelines:

- *Flexibility.*—The primary goal was to maintain flexibility to meet the future needs of users in telecommunication matters within the framework of the international radio regulations.
- *Minimal change.*—The preparatory efforts should result in proposals for only those changes to the radio regulations

that were absolutely required in order to meet the needs of users.

- *Defensible positions.*—The proponents of new requirements should be in a position to defend the required revisions of the radio regulations, including allocations, using sound and fully developed technical arguments, including accurate and current listings in the master international frequency list.
- *Accommodate world needs.*—The preparatory work should take into account the proposals for changes to the radio regulations advanced by other nations and should resist only those that might impede our national flexibility to an unacceptable degree.
- *Point of no retreat.*—Where it was apparent that proposed U.S. changes to the radio regulations, including modified allocations, are likely to be opposed, the preparatory work must develop, in advance of the conference, final fall-back positions.

U.S. preparations involved broad participation by Government agencies, the telecommunication industry, and the public. There was active U.S. participation in planning sessions held under the auspices of such international organizations as CCIR, as well as in multilateral forums such as NATO, the Conference of European Post and Telecommunication Administrations, and CITEL.

Within the United States, FCC, as the body responsible for the regulation of nongovernment uses of the radiofrequency spectrum, established docket 20271 as early as January 1975 to develop the nongovernment U.S. proposals for the conference. NTIA, through IRAC established Ad Hoc Committee 144 to develop the proposals of the United States affecting Government users of spectrum. IRAC also participated in Ad Hoc Committee 144. Eventually, FCC issued nine NOIs that drew comments from many segments of the telecommunication industry and the public. Through this process FCC developed and adopted the proposals for commercial, private, and non-federal government use of the spectrum.

Ad Hoc Committee 144 of IRAC had representation from all Federal agencies with a major interest in radio communications and spectrum use. It was responsible for developing recommended U.S. proposals for WARC-79 concerning Government use of the spectrum. Both FCC and NTIA staff experts were involved in commenting on the proposals of other administrations and developing position papers for the delegation to the conference, including compromise or fall-back positions.

Recommended U.S. proposals adopted by FCC (nongovernment) and NTIA (Government) were fully coordinated and submitted to the Department of State which was itself aware of the proposals as they were being developed through participation in FCC and NTIA processes. Therefore, the State Department was knowledgeable about large areas of agreement as they were reached, as well as the fewer areas of disagreement. Almost all the differences concerning the proposals to be made by the United States were successfully resolved between FCC and NTIA. Only one issue (proposed allocations for international broadcasting in the HF bands) was carried to the President through the National Security Council.

Industry proposals and views or those of nongovernment service suppliers or organizations are treated within the FCC mechanism. FCC, barring appeals to the courts, has the final responsibility and authority for regulating the nongovernment use of the spectrum. Therefore, FCC develops nongovernment proposals under the open and due process procedures of the Administrative Procedures Act. FCC must decide among competing and often conflicting proposals advocated by various segments of the communication industry, other commercial users, private and public users, as well as State and local government users.

Advance preparations for WARC-79 got underway at the State Department as early as 1975 when it began work on obtaining funds for the delegation, the selection of the head of delegation and of other members. In 1977, the State Department sought information on the views of other governments and the positions likely to be taken by them. Requests for information were cabled to U.S. embassies abroad but the results were not satisfactory for several reasons. The United States has only one telecommunication attaché (based permanently in Geneva). Embassy personnel in many posts apparently lacked the necessary expertise to discuss the subject with responsible foreign officials and effectively gather information. The reporting task was rendered even more difficult by the fact that many proposals of the Third World countries were not fully developed until shortly before the conference began.

In 1978, the State Department established a public advisory committee for WARC-79 consisting of 38 members from industry and the general public. Several public interest groups, researchers, educators, and minority interests were represented. The purpose of the advisory committee was to advise the State Department and the head of the WARC delegation in all areas related to the conference and to help develop positions and negotiating strategies. There was some criticism of the role of this advisory committee from both members and nonmembers. Some of its members felt that their views had little or no impact.

Beginning in 1977, the State Department arranged for international consultation to communicate and explain the U.S. views and proposals as they were being developed for the conference. Bilateral discussions were held in 48 countries by teams of U.S. experts involved in the preparation process. In addition, the United States participated in multilateral forums. Proposals of interest to the U.S. military were also described and coordinated through NATO and its Allied Radio Frequency Agency.

CCIR and other ITU activities also provided an opportunity for the United States to discuss its views in international forums. CCIR held an SPM in 1978 to prepare a technical base for the guidance of the conference and for administrations then preparing their own proposals. ITU itself held three seminars (in Kenya, Panama, and Australia). These seminars were primarily for the benefit of the developing nations—to acquaint them with the issues they would face in the conference and with the technologies that had been developed most recently in the radio-telecommunication field.

In January 1978, Glenn O. Robinson, professor of law at the University of Virginia and a former FCC commissioner, was named head of the U.S. delegation to WARC-79. Professor Robinson was given the rank of Ambassador for the duration of the conference. This limited appointment by the President did not require Senate confirmation. This raised some concern about the general question of the selection process for the head of U.S. delegations to international telecommunication conferences. More specifically, there was concern expressed by several Senators over U.S. preparedness for the conference, especially focused on the question of the U.S. ability to counter effectively the expected demands of the less developed countries for a greater share of frequency allocations and for changes in ITU procedures. The submission of Professor Robinson's name for Senate confirmation as Ambassador to the conference may have provided an effective opportunity to explore those concerns.

Subsequent to Robinson's designation, an initial delegation of 20 representatives from Government agencies was formed and eventually the full delegation of 67 persons was named. In addition, some 30 individuals were named to a U.S. technical support group that worked first in Washington, D.C., and later in Geneva.

Traditionally, U.S. delegations to telecommunication conferences are made up largely of spectrum managers and technical experts from Government agencies and industry. Theoretically, representation on the delegation should not be necessary to protect the particular interests of an agency, industry, company, or other organizations or groups because the delegation is committed to work for the U.S. proposals adopted during the preparatory process described above. Not only are the U.S. proposals adopted and submitted to ITU before a conference convenes (in this instance, by January 1979), but compromise positions are likewise agreed to within the United States before the conference.

However, during a conference—and WARC-79 was no exception—new compromises and new alternate proposals are often required when previously agreed U.S. proposals are not accepted by other administrations. At such times, the delegation, in consultation with higher echelons of Government in Washington, must develop and then agree on the new positions. In such circumstances, U.S. delegations almost without exception strive for compromises that will win general acceptance and that are as close as possible to the original U.S. proposals and thoroughly consistent with U.S. goals agreed to prior to the conference.

Proposals to modify the international table of allocations are based largely on the requirements or desires of individual countries to operate particular radio services in particular bands. Needs differ among countries. Decisions are driven in many cases by such nontechnical arguments as economic and national importance of one service vis-a-vis another. On the other hand, allocation decisions may be dictated by technical considerations, particularly those allocations involving the sharing of frequencies between two or more services. The arguments supporting these latter allocations are based on complex technical factors: acceptable interference levels and noise, power flux densities, antenna patterns, etc. For these allocations, the conclusions of the technical committee of a conference on the feasibility of and conditions for sharing often determine the successful adoption of the proposed allocation. In such discussions, obviously, the participation of the technical experts on the delegation is essential. Often such technical experts are not spectrum managers but work for Government or nongovernment organizations which operate communication facilities or other radio facilities. In the case of Government agencies this includes NTIA, NASA, the Federal Aviation Administration, DOD, FCC, and others. In the case of nongovernment organizations, it includes employees of companies that provide telecommunication systems and services, such as AT&T and COMSAT, and equipment manufacturers such as Hughes Aircraft Co. and the Harris Corp. The role of these nongovernmental experts is of great importance to the work of the delegation.

Since 1959, an average of 33 percent of the U.S. delegations to the eight ITU conferences held during that period were engineers and scientists from nongovernment organizations. For example, at the broadcasting satellite WARC held in 1977, 41 percent of the U.S. delegation was nongovernment. The U.S. delegation to the WARC-79 conference was predominately Government. Only 27 percent of the delegates were nongovernment including 18 percent from the telecommunication industry (see table 1).

Delegations from other developed countries include spectrum managers from the government ministries of telecommunication (often referred to as PTT's; postal, telegraph, and telephone authority) and engineers, scientists, and technical experts involved with the design, development, and operation of telecommunication systems and other radio equipment. Unlike the structure in the United States, most other countries place the operation of "commercial," as well as government, communication facilities in the hands of the government, or with an entity owned or controlled by the government. Therefore, the composition of foreign delegations is predominately government with

Table 1.—U.S. Delegates to WARC-79 by Organization

Organizational affiliation	Number of delegates	Percent of delegates
Federal Government:		
FCC	18	26.5%
NTIA (and other Commerce Department)	8	12
Department of Defense	6	9
Department of State	6	9
NASA*	4	6
International Communications Agency**	2	3
Department of Transportation	2	3
National Science Foundation	1	1.5
Office of Science and Technology Policy (White House)	1	1.5
Total	48	71.5%
Private Corporations:		
COMSAT	3	4.5%
AT&T	1	1.5
Hughes Aircraft	1	1.5
Motorola	1	1.5
Rockwell International	1	1.5
Satellite Business Systems	1	1.5
Western Union	1	1.5
Total	9	13.5%
Industry associations	3	4.5
All other	7	10.5
Total	67	100 %

*Includes Systematics General Corp. representatives.
**Includes Board of International Broadcasting.

SOURCE: Office of Technology Assessment.

some representation from manufacturers of communication equipment.

When it comes to a discussion of technical issues, such as system design capabilities and sound operating practices, the experts on other delegations expect their proposals to be discussed by similarly knowledgeable experts from the United States. Over the years, U.S. delegations to international telecommunication conferences have included industry and private sector experts involved in the day-to-day operations of communication systems. This is a natural result of the U.S. structure whereby the ownership, operations, and management of commercial and private communication systems are functions performed by private enterprise subject to Government regulation. U.S. telecommunication companies, and not the U.S. Government, are responsible for negotiations with foreign entities for the construction and operations of international telecommunication facilities. These companies undertake the financial obligations and own the U.S. share of the commonly operated international facilities with foreign entities. For example, AT&T and the several U.S. international record carriers own and operate submarine cables between the United States and Europe under contractual agreements with European telecommunication authorities. COMSAT owns and operates the U.S. share of the satellites operating in the global International Telecommunications Satellite Organization (INTELSAT) system together with 106 other countries.

The U.S. Government conducts negotiations on telecommunication matters of a foreign policy nature including U.S. participation in ITU conferences. In forming U.S. delegations to ITU conferences, the Government has looked to the U.S. operating companies and equipment manufacturers to provide expertise not generally available within the Government. A delegation of Government and industry representatives reflects the split responsibility for telecommunication activities in the United States. The inclusion of industry experts on U.S. delegations was brought into question in 1978 as a result of an apparent conflict of interest in an international conference dealing with an entirely different subject (the renegotiation of the international coffee agreement during which representatives from coffee companies participated as members of the U.S. delegation). Following that incident, the Department of State, acting on the advice of the Department of Justice, adopted new guidelines based on the conflict of interest provisions of the U.S. Code (secs. 203, 205, 207, and 208 of title 18) that effectively limited participation of nongovernment delegates to international conferences. Although the guidelines permitted nongovernment delegates to address technical points, they prevented such delegates from addressing policy issues or serving as spokesperson for U.S. proposals.

These restrictions were first imposed during the highly technical 1978 SPM of CCIR in preparation for the WARC-79 conference.

An amendment to a State Department appropriation bill (Public Law 96-60) introduced by Sen. Harrison Schmitt, and passed by the 96th Congress, exempted WARC-79 from these guidelines. However, the exemption came only shortly before the conference, leaving the role of nongovernment delegates uncertain until late in the preparatory effort. This may account, in part, for the low percentage of industry delegates to WARC-79.

Legislation to exempt all international telecommunication conferences from the restrictions of the State Department guidelines was enacted in the 96th Congress. However, the legislation to which it was added was vetoed by the President (the reason for the veto was unrelated to the exemption). The Senate again passed the exemption provision, but the House did not consider the measure before adjournment.

Another issue concerning the makeup of U.S. delegations was highlighted in preparing for WARC-79. In formulating proposals for nongovernment use of the spectrum, FCC must evaluate needs and sort arguments among competing commercial and private interests vying for spectrum allocations. This process follows FCC guidelines for rulemaking under the Administrative Procedures Act. Basic issues about the fairness of this process were raised by the timing of establishing the U.S. delegation.

The benefits derived from early creation of a U.S. delegation to prepare for the conference were recognized for WARC-79. However, conflict of interest and violation of due process were also recognized as possible consequences of naming industry representatives to the delegation before the FCC process of adopting U.S. proposals was complete. The concern was that individuals named to the delegation would be in a position to advocate the proposals of their companies in FCC's decisionmaking process better than those companies without representatives on the delegation. Moreover, delegates were likely to have access to information not generally available to nondelegates, giving credence to the argument that those companies with representatives on the delegation would have an advantage in supporting positions before FCC over those companies not represented and who might be taking contrary or conflicting positions in the FCC process.

This problem was avoided by naming only Government representatives to the WARC-79 delegation during the time of the FCC deliberations. Following adoption of proposals and the conclusion of the FCC process, industry and other nongovernment representatives were named to the delegation. This may also account, in part, for the relatively small number of industry representatives on the delegation. Also, some industry and Government officials have argued that the addition of industry experts to the delegation at such a late stage (spring of 1979) reduced their role and effectiveness.

An additional issue concerning the formulation of the delegation resulted from the real or perceived need to include individuals with differing viewpoints, to add representatives from public and consumer interest groups, and provide adequate participation by minorities and by women.

This, together with the pressures from Federal agencies, various elements of industry, public, and special interest groups to be represented on the delegation made the selection and functioning of the U.S. delegation a perplexing exercise open to criticism. On the one hand, these problems can be dismissed as a reflection of the times and the increased importance of telecommunication in all sectors of society. The stakes are high and the need to be represented is perceived to be important. On the other hand, the problems may reflect the absence of a clear Government policy regarding the selection and approval of individuals to serve on delegations to telecommunication conferences.

Adding representatives to the delegation with no apparent role other than to fulfill some nonspecific requirement to include special interest, racial, or sexual representation proved to be frustrating for all concerned with no apparent benefits. There were four delegates funded by the Department of State under the "Biden amendment."* At least two of those delegates have stated publicly that their role was never defined nor did they provide any substantive contribution to the deliberations of the delegation. Other members of the delegation were also apparently unsure of the role of the Biden amendment delegates. One of the Biden amendment delegates reported that other delegation members seemed to treat the Biden delegates as though they had not earned the right to be on the delegation.

As stated above, the function of the U.S. delegation at international telecomunication conferences is to seek agreement on U.S. proposals submitted to the conference. These proposals are developed under U.S. domestic procedures and laws. Any shortcomings in these procedures regarding participation of concerned and interested parties are unlikely to be corrected by last minute measures to add to or adjust the membership of U.S. delegations. The process of preparing for international conferences should include the natural selection of the most qualified individuals to serve on U.S. delegations with the range of skills and disciplines required to negotiate the U.S. proposals. Representation on U.S. delegations cannot overcome any perceived deficiency in U.S. domestic processes.

Clear guidelines for the type of representation to be included are necessary and measures to ensure that the right combination of skills are represented by the individuals selected to serve on U.S. delegations are essential. That individuals with these skills will be available when needed should not be left to chance. Specific action to develop and train individuals and assure that U.S. delegations are equipped with these skills would help alleviate the problems encountered in preparing for WARC-79.

The OTA-sponsored survey on WARC-79 preparations and impacts asked respondents to list the four or five most important qualifications an "ideal" member of a U.S. delegation to a WARC-type conference should have. While no human being could meet all of the qualities listed by all of the respondents, a U.S. delegate who conformed to the most frequently repeated qualifications would require the following attributes:

Personality
- good communicator, adept at self-expression;
- mature, "diplomatic" personality;
- international reputation in some field;
- willing to accept advice from technical experts;
- able to exert independence from parochial interests;
- willing to compromise; and
- willingness and ability to work hard.

Experience:
- negotiating experience, particularly at ITU meetings;
- spectrum management experience; and
- operational experience in at least one radio service.

Knowledge:
- broad understanding of telecommunications, including technical competence and an understanding of the societal impacts of telecommunication technology;
- ability and understanding necessary to support and explain U.S. positions at the conference;
- knowledge of present and planned spectrum management requirements of U.S. users;
- knowledge of ITU history and procedures;
- a "feel" for international politics, or at least a personal world view; and
- fluency in at least one foreign language, usually cited as French or Spanish.

Sensitivity:
- sensitivity to Third World positions and cultural differences;

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*According to a amendment sponsored by Senator Joseph Biden, which became sec. 113 of Public Law 95-105, the State Department is authorized to reimburse individuals or organizations for their costs of participation in State Department activities if such persons represent an unrepresented or underrepresented interest in the proceedings and otherwise could not afford to participate.

- sensitivity to U.S. national security concerns; and
- sensitivity to users' and consumers' needs, and the ability to relate these needs to spectrum allocations.

The results of the OTA-sponsored survey also show that a majority of the respondents chose "selection of the most effective delegation possible" as the number 1 goal of the preparatory process from a list of 12 goals. However, less than half (48 percent) of the respondents felt that the process was moderately effective in achieving that goal. Another 25 percent felt that the effectiveness of the process was low and another 12 percent said it was totally ineffective in achieving that goal. Only 14 percent of the respondents rated the degree of effectiveness of the process high in achieving the goal of selecting the most effective delegation possible.

Possible actions to address the problems of industry participation and broader representation of interests and skills are discussed in chapter 5 of this report.

Chapter 4

WARC-79 Overview, Actions, and Impacts

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Chapter 4

WARC-79 Overview, Actions, and Impacts

From the point of view of a developing country burdened with poverty, illiteracy, and disease, access to modern telecommunications is every bit as vital as it is to the United States. Conversely, whether the Department of Defense (DOD) can communicate with a missile submarine at sea or a high-flying jet bomber over Alaska is of much less consequence to the leader of a Third World country than whether he can send a simple radio message to a doctor or village administrator 100 miles outside his capital city.

The gap between the modern "information society"—with its computers, microprocessors, and multichannel satellite systems—and the developing nations struggling to harness basic, unsophisticated radio systems to the task of economic development is growing wider. At today's pace, a villager in central Africa is likely to watch an American film on a community television set long before he has an opportunity to use a telephone.

The gap in priorities is equally wide. It is difficult, for example, to persuade a representative of a developing country to give up certain radiofrequencies that provide him with a rudimentary telephone system in order that the Voice of America can broadcast more clearly. The task of persuasion is made no easier by suggesting that a satellite or a microwave system would provide the developing country with better phone service with more efficient use of the spectrum when, in fact, such systems may be too costly for many developing countries.

When the technically advanced, industrial nations get together with Third World countries to discuss telecommunications and spectrum management, their needs and priorities are so different that their negotiating goals and objectives are far apart. Viewed against this background, and the mounting frustrations of the developing countries, U.S. delegates to the World Administrative Radio Conference (WARC-79) that convened in Geneva in September 1979, had reason to be wary. It was the first general administrative radio conference in 20 years and was unquestionably the largest and most significant intergovernmental meeting on radio communications in more than a decade.

There had been tremendous advances in telecommunications since the last WARC, held in 1959. Worldwide demand for improved communications had greatly increased, together with a sharp rise in the demand to use the radio spectrum. Inconsistencies had developed in the general regulations having to do with more than one of the individual radio services. A number of specialized radio conferences had taken place since 1959 resulting in decisions that were inconsistent with one another, thus adding to the urgency of convening a general conference.

The U.S. Role

As the largest and most technically advanced user of the radio spectrum on a worldwide basis, the United States approached WARC-79 with the greatest stake in reaching agreement on a new table of frequency allocations and a revised set of related technical and administrative regulations. At previous WARCs, the United

States had been a strong advocate of compromise and had tried to set an example by not taking reservations that would indicate refusal to abide by a particular decision of the conference.

A determination to avoid needless controversy and to arrive at mutually acceptable compromises continued to guide the U.S. delegation at Geneva in 1979. The goal of the United States was to ensure that whatever changes were made in International Telecommunication Union (ITU) regulations governing the allocation and use of radio spectrum were made in light of current U.S. economic, social, and technical requirements. The United States would support incremental change, but not wholesale shifts in spectrum allocations or in ITU procedures. Because of the rapid and frequently unforeseen changes in communications technology, the United States was committed to the general principle of flexibility so that any decisions made at WARC-79 would permit future accommodation to new circumstances.

The United States was on record as supporting, in principle, changes in international spectrum allocations and related frequency management procedures that would accommodate the needs of other nations, consistent with its own interests and with the essential requirements and sound principles of international spectrum utilization.

How WARC-79 Differed From WARC-59

WARC-79 was vastly different from any previous ITU administrative radio conference, both in size and complexity. Membership in ITU stood at 154. Almost half the nations eligible to attend WARC-79 did not even exist in 1959.

These new nations brought rising expectations that increased demand for telecommunication services worldwide. New communication technologies that made increasing use of different forms of telecommunications had come into being including satellites. Other techniques made it possible for radiofrequencies to carry more information than ever before. Coordination and avoidance of interference procedures were more highly developed.

While the countries of the developed world introduced these improvements as a matter of choice, developing nations often could not afford to abandon less expensive and less sophisticated equipment and procedures even though these were not technically efficient in their use of spectrum. They had to be content with older, less sophisticated telecommunication systems while the industrialized nations pursued new technologies and services vital to their growing information economies.* The developed countries, for example, could seriously consider shifting some broadcasting services out of the radio spectrum entirely and onto cable to make room in the ultrahigh frequency (UHF) and very high frequency (VHF) bands for new mobile services. Most Third World countries could not conceive of such a move.

WARC-79 differed from WARC-59 in that demands on the radio spectrum had significantly increased; more countries were making greater use of spectrum for a greater variety of purposes. Moreover, the conference sessions, while still highly technical in nature, were influenced to a greater extent than in the past by political and economic considerations that can best be understood within the context of a confrontational North-South relationship and the so-called "New World economic order." This new relationship is characterized by more sharply defined demands of the less developed nations for a redistribution of the world's wealth and resources, and for an end to what they regard as exploitation by the industrialized nations. It is also marked by a growing awareness among developing countries that in many international fora where the "one-nation, one-vote" principle prevails they enjoy an advantage in numbers.

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*It should be recognized that technically inefficient uses of spectrum may nonetheless be economically most efficient at a particular stage of development for a developing country.

There is a long history of international cooperation in radiofrequency matters, but there were forces at work that made agreements difficult to reach at Geneva in 1979. The developing countries were guided by a set of general principles aimed at gaining preferential treatment for themselves (e.g., an Algerian proposal to give priority to developing countries in the use of 70 percent of the high frequency (HF) fixed bands). They demanded guaranteed access to certain congested frequency bands and to the geostationary satellite orbit. They refused to accept the vital importance for national security and financial investment of some advanced U.S. communications systems. Moreover, there was an unwillingness on the part of many developing countries to accept package deals in which a U.S. concession in one area was linked to a developing country concession in another.

WARC-79 also differed in that there were recognizable ideologies in spectrum matters that were associated with particular countries or groups of countries. For example, those countries that already had extensive telecommunication systems were most interested in pursuing expensive efforts to get the most out of spectrum and to identify those frequencies that were not being fully utilized. Countries that were still developing their telecommunication services were anxious to prevent the more sophisticated users from preempting their potential use of large portions of the radio spectrum and geostationary satellite orbit space before they, themselves, could determine their own future needs.

This is not to say that there was unanimity among the Third World nations. They differed sharply in their goals and interests. For example, Brazil was anxious to develop its own satellite communications system and disputed the claims of Colombia and other equatorial nations to sovereignty over the space above their territories where geosynchronous satellites could be parked.

Nor did the developed countries always share the same sense of priority. Other North Atlantic Treaty Organization (NATO) members gave only lukewarm support for certain U.S. military requirements for spectrum and the United States and Canada split over some important issues.

The United States has found it necessary in the past to take reservations and other actions at ITU conferences to protect its interests. The United States took a substantive reservation at the 1937 WARC, refused to sign the Final Acts of the 1950 Mexico City WARC, and did not become a party to the additional radio regulations. However, as noted earlier, the United States has been a strong advocate of compromise and has for the most part refrained from using the accepted practice of taking a reservation on a particular clause or section of the Final Acts of a conference to indicate that the provision would not be considered binding. The only substantive reservation dealing with radio communication taken by the United States in recent years was at the 1974 maritime WARC.

At WARC-79, the U.S. delegation found it necessary to deviate from this policy of setting an example for resolving differences within the conference. The United States ultimately took six reservations, helping to bring the total to 83. Two of the six were directed at political issues but the remaining four have a direct impact on U.S. telecommunication operations. In one of these, the United States rejected the terms of a footnote to the ITU radio regulations that could jeopardize the continuing use of U.S. military mobile satellite systems in the UHF band.

The Impacts of WARC-79

Finding a meaningful way to measure success and evaluate results of an administrative radio conference is not as simple as comparing specific U.S. proposals submitted to the conference with the Final Acts of the conference. While such a comparison is important, it does not reflect the underlying reasons and motives for particular decisions, the problems encountered, or any apparent trends important in evaluating results of an administrative radio conference. It is important to understand the intervening events that underlie decisions, not only to evaluate the results of WARC-79, but to prepare for the many future conferences important to U.S. interests.

The specific consequences of WARC-79 decisions on U.S. interests regarding particular services can best be treated in terms of how the conference dealt with specific technical issues created by some significant trends in telecommunications. These trends include the following:

- A reduction in the use of HF (3 to 30 MHz) by international fixed point-to-point operations as satellite and cable use expands, coupled with the increasing demand for HF spectrum by the more developed countries to meet maritime and international broadcasting needs, conflicts with the desires of the less developed countries to use HF for inexpensive domestic communications.
- The rapid growth in VHF (30 to 300 MHz) and UHF (300 to 3000 MHz) land-mobile operations in the face of continuing vital military requirements and the heavy use of these bands for TV broadcasting now necessitates greater sharing of frequencies, for example, by radiolocation sharing with radionavigation and with other services, and by land-mobile sharing with TV broadcasting.
- There has been rapid growth of both domestic and international fixed-satellite requirements in the super high frequency (SHF) (3 to 30 GHz) spectrum coupled with growth in microwave radio relay, space research, and Earth-exploration satellite services, and the continuing need to protect important radio-astronomy operations.

These requirements are being pressured by new demands to accommodate mobile, navigation, and broadcasting satellites (and their feeder links) in increasingly crowded orbits. Most of these satellite spectrum uses have military as well as civil applications. In addition, there is the continuing use of the SHF spectrum for terrestrial systems.

The actions of WARC-79 with respect to these operational trends and the technical issues they raised either closely reflected U.S. proposals or were acceptable to the United States with certain important exceptions. However, this judgment hardly does justice to the overall results of WARC-79, particularly the future implications for the United States. The long-term trends may be running against the United States in the sense that more problems without apparent solutions are foreseen. The United States finds itself increasingly in a defensive mode, trying to minimize losses rather than seeking significant changes to improve the long-term posture of the United States.

For example, significant amounts of spectrum were added to the allocations for the fixed-satellite service (FSS) in general accordance with U.S. objectives. The technical rules that affect the design and operation, and hence the cost, of satellite systems were generally in agreement with U.S. positions. Where U.S. desires were not precisely met, no significantly adverse repercussions resulted. No immediate or significant changes in the structure or operation of U.S. fixed-satellite telecommunication services will result from conference decisions. No operational or economic dislocation was imposed on any existing FSS system, and no major burden appears to be placed on the Government, or private operating entities, in order to comply with the decisions of WARC-79 regarding FSS.

However, the conference also adopted a resolution that calls for a space planning conference to be held in two sessions to plan space services using the geostationary satellite orbit. The first session, to be held in 1985, will define the type of planning and determine which services and which frequency bands should be planned. The second session, scheduled for 1987, will do the actual planning. The space conference, as well as the previously scheduled broadcasting satellite conference set for June 1983 to plan broadcasting satellite service in region 2 (the Americas) in the 12-GHz band, are of vital importance and concern to the United States. The ability to implement new technologies and offer new services via satellite in the years ahead depend in part on the decisions taken at these future conferences.

There is a significant difference between the approach advocated by the United States for using the geostationary satellite orbit and any rigid a priori allotment and planning approach advocated primarily by some developing nations. The United States, as well as other countries, has consistently favored a flexible approach that assigns orbit locations and satellite frequencies on a case-by-case basis, often referred to as "first-come, first-served." The U.S. approach seeks to accommodate needs as required and relies, at least in part, on technological advancements and good engineering practices to "engineer in" the next satellite and accommodate all users. Such an approach is consistent with existing practice under ITU procedures for the notification, coordination, and assignment of radiofrequencies generally.

Many developing countries, on the other hand, see a negotiated plan that assigns specific frequency channels and orbital positions to each country under a rigid a priori allotment plan as a means to guarantee future access. This approach does not depend upon advances in technology or new engineering technologies to assure accommodation of newcomers, but neither does it provide for technological improvements that might be necessary to accommodate growing requirements. The developed countries already have the economic and technological means of launching and utilizing domestic satellite systems; most developing countries do not, even though many do make use of joint user systems like the International Telecommunications Satellite Organization (INTELSAT) global satellite system. The developing nations are concerned that as "late comers" (hence later served) there will be little or no way to accommodate their domestic requirements.

Both a posteriori (the case-by-case approach usually relying on a notice and recordation procedure) and a priori (the collective subdivision approach usually relying on a negotiated plan) have won past acceptance at conferences of ITU. Over the last 75 years one or the other approach has been advocated and used by nearly all nations to allocate spectrum, both internally and internationally. On a domestic level, the a posteriori approach is often coupled with an adjudication procedure for deciding among competing applicants, as is the case in the United States. On the international level, adjudication is almost impossible because of sovereignty claims. Most nations have been unwilling to allow an international body to determine whether they can or cannot use a radio channel or satellite position. Where channels become limited, the recourse in the recent past has been to adopt an a priori method. However, for the allocation of radio bands and services like FSS, which are affected by rapidly changing technology, or which are fraught with political controversy, a priori methods tend to promote too rigid technical specifications or exaggerated claims for channels. Much of the controversy at WARC-79 and that likely to emerge at future conferences, arises from the question of the appropriate administrative arrangements to determine rights to the use of frequencies free from harmful interference.

Several countries made planning proposals at WARC-79, ranging in scope from planning all services in all frequency bands to allocated space services, planning only FSS in bands newly allocated to that service below 10 GHz. However, it is clear that FSS was the main target of these proposals. Developing a plan of this nature is an enormous undertaking and would not have been possible at WARC-79; however, acceptance of the principle of "planning" was a major goal of the developing countries.

The U. S. delegation worked to prevent any decision to convene a "planning" conference. When it became clear that such a conference would be approved, the United States argued successfully to keep the terms of reference rather broad. The first session of the "WARC on the Use of the Geostationary Satellite Orbit and the Planning of Space Services Utilizing It," scheduled for July 1985, will consider which services and which frequency bands to "plan." Further, the meaning of "plan" will be decided, and will not necessarily be a rigid "a priori" type. The operative thought in determining the type of planning is to provide "in practice equitable access" to the geostationary orbit. The second session of the conference, scheduled for September 1987, will meet to enact the decisions of the first.

It has been the official position of the United States, shared by a number of other countries, that a rigid a priori plan for FSS is bad planning and bad engineering; that it is likely to inhibit technological innovation, result in inefficient use of the orbit and spectrum and have a major adverse impact on U.S. telecommunication systems. Thus, the United States faces a significant challenge over the next few years to develop compelling arguments against a rigid a priori approach and to carry that message convincingly to all parts of the world well before these conferences convene; or to find alternatives acceptable to all parties. Examples of such alternatives are discussed in chapter 5.

The adoption of the space planning conference resolution is a vigorous reminder that the effective management of orbit and spectrum utilization on both a worldwide and a regional basis is a continuing process that is becoming increasingly more difficult and complex. The achievement of U.S. objectives at ITU conferences is no longer a matter of reaching painstaking agreement on technical solutions to problems of coordination and multiple usage of spectrum. It will require sophisticated, political negotiations; imaginative, innovative approaches; and long, hard bargaining.

Perhaps an acceptable compromise will be found regarding the satellite orbit planning issue prior to the 1983 region 2 conference. Nevertheless, the mechanism to develop and test a possible solution before the meeting is not now apparent, and the task of shaping a compromise during the meeting may prove too difficult. While there is no certainty that the majority of the region 2 countries will favor a rigid orbital and frequency allotment plan like the one adopted for regions 1 and 3 at WARC-77 for broadcasting satellite service (BSS), the United States must be prepared for such a prospect nevertheless. According to the OTA survey cited in chapter 3, only 8 percent of the respondents believe that a compromise between the United States and the Third World positions on a priori allotment is impossible; an additional 15 percent believe that a compromise is possible, but undesirable. A majority of the respondents, 68 percent, believe that a practical compromise is possible and desirable, although relatively few have any specific concept of the form such compromise could take. The remaining 9 percent expressed no opinion.

Key Conference Decisions and Their Consequences

The Fixed-Satellite Service

FSS is defined as "a radio communication service between Earth stations at specified fixed points when one or more satellites are used; in some cases this service includes satellite-to-satellite links, which may also be effected in the intersatellite service; FSS may also include feeder links for other space radio communications services."

This definition fails to convey fully both the diversity of applications that already exist, and those that are expected to be accommodated in FSS in the future. The emergence of the wide variety of applications for fixed-satellite service stems in a major way from the properties of a natural phenomenon known as the geostationary satellite orbit. This orbit is circular, some 165,000 miles in circumference, and in the plane of the Equator approximately 22,300 miles above the Earth's surface. At this altitude, a satellite in orbit rotates about the Earth's axis at the same rate as the Earth (one revolution per day) and appears to be stationary when viewed from a point on the Earth. This special characteristic of the geostationary orbit allows an Earth station antenna to point at a geostationary satellite without the need for expensive antenna-tracking equipment. Earth stations in the intended coverage area and a geostationary satellite are continously visible to each other in contrast to a satellite in any other orbit. These unique characteristics have caused the member nations of ITU to view the geostationary orbit as a "natural resource." The ITU convention recognizes the geostationary satellite orbit as a limited natural resource.

With consideration only for avoidance of physical collisions between satellites, the number of satellites that can be placed in the geostationary orbit is nearly unlimited. However, the current ITU convention recognizes that satellites operating in a common-frequency band must be sufficiently separated to avoid harmful interference. For example, U.S. communication satellites currently operating in the 4- to 6-GHz frequency bands and serving the same or adjacent coverage areas are presently required by the Federal Communications Commission (FCC) to be separated by 4°. It is important to note that the required separation between satellites operating in the same frequency band could be greatly reduced if the coverage areas are separated geographically. For example, satellites operating in FSS with proper antennas could be essentially colocated in the geostationary orbit when one satellite serves the United States while the second satellite serves a South American country.

A second limitation to the capacity of the geostationary orbit occurs as a consequence of geometric considerations. Only a portion of the geostationary orbit is visible from a particular coverage area on Earth. To illustrate, table 2 shows the portions of the geostationary orbit "available" to the various countries in region 2.

Sharing of the geostationary orbit in a particular frequency band is principally a problem of sharing between adjacent countries. For the United States, the sharing problem is largely with Canada and Mexico. The dimensions and capacity of the geostationary orbit available to the United States, assuming an appropriate international coordination approach, is essentially independent of the use of the orbit by countries in regions 1

Table 2.—Service Arc of Geostationary Orbit

World region	Coverage range	Visibility arc for minimum elevation angle of 10° (degrees in west longitude)
North America	Canada, including Yukon and Northwest Territories	114-116
	Canada, Vancouver to Halifax	61-128
	USA, including Hawaii, Alaska, and Puerto Rico	133-134
	USA, CONUS only	61-134
	USA, CONUS and Hawaii	91-134
Latin America	Brazil	0-109
	Columbia	10-143
	Chile/Argentina	10-130
	Total regional coverage	10-109
	Mexico/Caribbean	46-143

SOURCE: Telecommunications Systems Inc.

or 3, or in South America. Conversely, the use of the geostationary orbit by countries in North America should not significantly limit the availability of the orbit for countries in the other regions or in South America. Again, this assumes an appropriate international coordination approach.

In summary of the points made above, the capacity of the geostationary orbit for a particular country operating in a given frequency band is determined primarily by four factors. These are:

1. the dimensions of the available arc as determined by geometric considerations;
2. the characteristics of individual satellites at each orbital position;
3. the separation between satellites operating in that band as required to avoid harmful interference; and
4. the number of adjacent countries planning to operate in the same frequency band.

The usable capacity of the geostationary orbit available to a particular nation may be increased under three of the limiting factors enumerated above. First, the capacity at each orbital position may be increased through application of technology improvements. Frequency reuse, higher satellite power, more efficient and higher gain antennas, and lower noise receivers are examples. The required separation between satellites is a second category of improvement possible through improvements in technology. Interference-resistant modulation methods and improved antenna sidelobe performance are examples. In the third category, the dimensions of the available orbit arc may be extended through the application of intersatellite links. As a first approximation, the available arc may be increased by the latitude extent of the service area. For the United States, the use of intersatellite links might more than double the available arc.

The ability of a country to make these improvements depends on its own level of technological advancement, ability to pay for such improvements, and the sociopolitical needs and trends within the country. Also, the extent to which a country can take advantage of these improvements is determined in part by the actions of other countries. Again, appropriate international coordination and cooperation are required. Chapter 5 discusses alternative approaches for coordinating use of the geostationary satellite orbit.

During the last decade many countries have taken advantage of the telecommunication capabilities offered by the orbit/spectrum resource. As a result there are many domestic satellite systems in operation and being planned, as well as international systems (e.g., INTELSAT) shared by many countries throughout the world. These systems support a variety of services, including broadcasting and maritime-mobile. The specific functions rendered by these established services, and those being planned or foreseen, include:

- Domestic and international point-to-point connections for trunk telephony and television distribution.
- "Thin-route" telephony and instructional television to remote areas.
- Data transmission and computer-to-computer communication.

- Facsimile, teletext, videotext (viewdata), and electronic mail.
- Interoffice connections for teleconferencing, inventory control, and the like, for large organizations.

Central to the utility and the economic attractiveness of satellite systems is their almost unlimited "connectivity" or flexibility; i.e., the possibility of mutually connecting a large number of Earth terminals through a single satellite. Thus, many nations believe that many of their future telecommunication needs can be satisfied by geostationary satellite systems, whether wholly owned or jointly operated by regional entities. This is true for both advanced and developing countries but particularly the latter who hope through the use of satellites to leapfrog many of the problems and much of the time and expense required to install conventional terrestrial communication systems.

At WARC-79, the United States sought to expand the allocations to FSS for both domestic and international use. There was a particular need for frequencies below 10 GHz and this requirement gave rise to considerable controversy throughout the conference. The United States was determined to preserve the status of the radiolocation service in the 3400- to 3600-MHz band, now used by important military radar systems. The band has long been shared with FSS, and in order to facilitate use of FSS systems, particularly INTELSAT, some delegations proposed to downgrade radar to secondary status. A compromise was ultimately worked out that restored primary status for radars subject to a footnote provision urging, but not mandating, ITU members to phase out of the band and to take practicable steps to protect FSS. The United States and several other countries formally declared their intention to accommodate FSS when it is feasible to do so. (This topic is covered in greater detail in a later section.) Allocations to FSS were also made in the 4- and 6-GHz bands.

In other actions, WARC made additional uplink allocations acceptable to the United States, including those at 6425 to 7175 MHz and 17.3 to 18.1 GHz. The former band was allocated to provide the uplink for fixed satellite service in the bands 3400 to 3700 and 4500 to 4800 MHz. Both bands (6425 to 7175 MHz and 19.3 to 18.1 GHz) were needed for feeder links to satellites in other services such as broadcasting and maritime-mobile satellites. Still other downlink frequencies were allocated to FSS in the band 10.7 to 11.7 GHz as the United States had proposed. These frequencies will also be used for the increasing requirements of INTELSAT.

A major objective of the United States was to resolve the difficult sharing situation in region 2 between FSS and BSS in the 1000-MHz bandwidth at 12 GHz. The conference agreed with the U.S. proposal to separate the two services by allocating the 12.1- to 12.7-GHz segment to the BSS and the 11.7- to 12.3-GHz segment to the FSS. Although the frequency-sharing between the space services was thus largely eliminated (12.1 to 12.3 GHz remains a shared band, but sharing may be completely eliminated by the 1983 regional conference), BSS must now share with the *terrestrial* fixed service including private microwave systems widely used in the United States. This sharing could result in interference to BSS Earth station receivers operating in the same area as private microwave fixed-station transmitters. The private microwave users are concerned that sharing with direct-broadcasting satellites is not feasible and oppose sharing in the 12-GHz band. The concern is that home receivers for direct-broadcasting satellites would receive interference from terrestrial microwave transmitters. As a practical matter, the microwave users anticipate the burden to resolve any resulting interference problems will be placed on them. This concern is reinforced by footnote 3787D of the Final Acts of WARC-79, which places terrestrial services on a noninterference basis to BSS operating in accordance with a plan to be prepared at the 1983 region 2 broadcasting satellite conference. How this conflict will be resolved within the United States is a current matter before FCC.

Existing FSS allocations at higher frequencies were maintained. In general, all U.S. objectives were met in the bands above 40 GHz (to 275 GHz). These bands will be used in future years as advanced technology is developed and as communication requirements continue to grow.

Apart from the decision to convene a space WARC to "plan" use of the geostationary orbit and related spectrum, WARC-79 will have some longer range impacts on FSS. For example, new allocations to FSS are likely to motivate system designers to exploit these frequencies, especially in the 4- to 6- and 11- to 14-GHz bands where bandwidth was more than doubled. In order to take advantage of this increased capacity, a spacecraft payload built on current technology would have to double in size, weight, and power requirements. To keep these at a minimum we may see renewed efforts at material development, to build, for example, lighter weight filters, more efficient solar cells and space-qualified solid-state amplifiers. The availability of the U.S. Space Transportation System (Shuttle) will have increasing impact on the capacity and costs of satellite systems, particularly when the shuttle attains full capability to locate spacecraft in geostationary orbit. The large bandwidth available may also create opportunities in traffic routing flexibility not possible with smaller bandwidths. This may stimulate spacecraft switching technology and the associated satellite-switch logic, as well as the development of shaped spot beams.

Generally speaking, the impact of WARC-79 on the availability and cost of FSS systems was favorable because substantial increases were granted in the "lower" frequency bands where technology is well developed and relatively economical. WARC also reaffirmed the FSS allocations near 20 and 30 GHz where the next generation of domestic communication satellites is now under development. When this new generation of satellite systems becomes operational, in a decade or more, there are likely to be lower costs and higher availability both in new types of services and in number of users, particularly those in remote areas.

U.S. operating practices for planning, allocating, managing, and using the spectrum allocated to FSS have not been altered as a result of WARC-79 decisions. The expansion of allocations would seem to mitigate some policy conflicts that might have existed before. For example, the guiding U.S. policy for commercial FSS systems has been to permit any financially and technically qualified entity to compete in the marketplace. The decision to allocate separate bands to FSS and BSS about 12 GHz serves to alleviate, at least temporarily, a potential problem area.

The results of WARC-79, insofar as FSS is concerned, do not impose any hardships on the Government to comply with the demands contained in the Final Acts. Some effort will be required to amend the existing documentation, manuals, and computer programs to reflect the new regulations and modifications to the old ones, but this is a one-time effort.

A related obligation concerns technical assistance to developing countries. WARC-79 adopted a series of resolutions and recommendations that call on the industrialized nations to give additional help to the Third World in telecommunciations. FSS is the service that developing countries look to for satisfying many of their needs. These resolutions and recommendations are basically in line with the U.S. approach to technical assistance since they regard the United Nations Development Program (UNDP) as the primary source of financing. They do not call for the establishment of either mandatory or voluntary funds for technical cooperation. But the question arises as to whether, and to what extent, it is desirable or necessary, as an extension of U.S. foreign policy, to offer unilateral assistance to developing countries with a view to influencing their attitudes on FSS "planning" and other issues. The potential benefits of using U.S. technology and expertise to provide assistance and develop closer coordination and planning activities with developing countries are discussed in chapter 5.

The Fixed Service

The fixed service above 1 GHz supports communication systems that are more commonly known as microwave, radio-relay systems and widely used in the United States by common carriers, Government agencies, and business.

Substantial frequency allocations between 1 and 40 GHz were made to the fixed service by the 1959 WARC. Those allocations (particularly those between 1 and 15 GHz) have been used extensively and considerable effort has been expended on the design of radio-relay equipment and field engineering methods. As a result, the available allocations have been used very efficiently. Increasingly large volumes of communication have been squeezed into each radio channel and there has been careful planning of adjacent systems to avoid excessive interference.

Because of the highly efficient use of existing allocations, there were few proposals at WARC-79 for changes. Those changes that were adopted by the conference consisted mainly of attempts to aline the allocations among the three regions and, by means of footnotes, to accommodate the specific needs of individual countries.

More significant for the fixed service were new allocations made to the space services that will permit additional use by those services, on a coequal basis, of bands already allocated to the fixed service. Such sharing was first included, on a limited basis, in the allocation table of 1963 as a means of accommodating the new concept of communication satellites. At that time technical criteria were introduced to control the amount of interference each service might impose on the other.

Sharing is not without cost, but these penalties have been felt to be in the interest of overall efficient use of the spectrum by all services in order to permit additional use of the frequency bands. There is a price paid in the practical use of radio-relay systems in the shared environment because of the need to shorten repeater spacings and to undertake complex route engineering to avoid interference to or from satellite Earth stations. This can result in the need to build more expensive repeater sites or even the addition of extra repeater stations to bypass a problem; it can also require a shift in frequency bands or, in extreme cases, switching to cable for some route segments.

With new provisions for sharing in additional bands, and with additional types of space services, the pressure on radio relay system design will be increased. The conference recognized this as a complex problem and identified several aspects of sharing on which further consideration and refinement are needed and asked the International Radio Consultative Committee (CCIR) to undertake appropriate studies.

The decisions of WARC-79 affecting the use of microwave radio relay systems do not mandate any drastic reconsideration of U.S. practices in allocating and managing the spectrum. The principal new allocations are those between 40 and 275 GHz, which open up a number of new, wide bands for the fixed service that are shared with several other services. There will be decisions to be made on whether any of these bands is to be limited domestically to an individual service instead of being shared broadly as provided in the international table, and whether any should be identified exclusively for U.S. Government or nongovernment use.

In order to simplify the administrative process for certain countries which otherwise might need to coordinate with a number of neighboring states, the radio regulations were revised and simplified at the risk of creating future interference problems. The changes were opposed by the United States, Canada, and others as counterproductive.

Potential policy conflicts involving the fixed service arise from WARC decisions on the shared use of frequency bands with space services. Such sharing requires accommodation or even sacrifices on the part of each service. How much sharing will be allowed, and the degree to which one service will be affected in order to facilitate the other, become policy determinations that are little appreciated at present.

The most conspicuous case that will require action in the near future is the treatment of the 12.1- to 12.7-GHz band. There, BSS will now share with private microwave systems. The use of sensitive receiving installations in BSS coupled with the necessity to locate them at any place within the service area of the satellite, essentially precludes radio-relay operation within the coverage area of a broadcasting satellite on any radiofrequency channel to be used for satellite broadcasting. Hence, the extent to which channels and areas are reserved for broadcasting, to the exclusion of private microwave systems, is under study in the United States and will be a major policy determination.

Another area of potential conflict is the sharing of frequency bands by the mobile-satellite service (MSS) and FSS. MSS is a different category of service than the discrete services like maritime MSS or land MSS. It was developed primarily for military satellite communications use, wherein the Earth station may be located from time to time anywhere within a defined area (and even operated in moving vehicles such as aircraft and ships), rather than being limited to a fixed, predetermined location. So far there has been little practical experience of this type, but the idea that a small essential area around the radio-relay station would be protected, while a large area would be reserved for the convenience of the mobile-satellite Earth station is a concept not fully understood or accepted. Because of these concerns, the conference made only very limited allocations to MSS.

As noted earlier, the provisions for space systems to share frequency bands with the fixed service tend to complicate, make more expensive, and even inhibit the growth of radio-relay systems, but in the past this has not resulted in the dislocation of existing services or systems.

The new allocations for broadcasting satellites to share in the 12.2- to 12.[illegible]-GHz band may well cause dislocations to private microwave systems. Frequency sharing will be quite a different problem from that in other "shared" bands. In fact, licenses being issued now for private microwave stations bear a warning to the effect that continued operation is not assured.

Distribution of television by terrestrial radio-relay systems may also suffer dislocations, depending on the ultimate decisions on sharing conditions. The 6.425- to 6.525-GHz band, which is the principal band used by common carriers for service to broadcasters and for closed-circuit uses such as medical demonstrations and sporting events, and the band 6.875 to 7.075 GHz, which is heavily used by the broadcasters, are now to be shared with satellites.

The Land-Mobile Service

For the past 20 years, land-mobile has been one of the fastest growing radio services. Not only has use of land-mobile radio systems increased for local governments, businesses and for other specialized uses, but land-mobile use as part of the terrestrial telephone network has increased greatly. Further growth can be expected with the advent of cellular public telephone systems and the increase of private radio requirements.

The United States has already added land-mobile to portions of the UHF television band 470 to 890 MHz in the U.S. domestic table of allocations, an action permitted under the ITU's radio regulations, provided no interference is caused to stations of other countries operating in those frequencies. The

United States proposed at WARC-79 that most of the band 470 to 960 MHz be allocated to the land-mobile service, sharing on a primary basis with broadcasting in the lower part, and with fixed and radiolocation services in the upper part. This would permit each country in region 2 to determine which of the internationally allocated primary services would be implemented in their own areas.

WARC only partially accepted these proposals. The mobile service was added to the bands 806 to 902 MHz on a primary basis, but on a secondary basis in the bands 470 to 512 MHz and 614 to 806 MHz. A footnote raises mobile to primary status in the United States, with the provision that such use is subject to the coordination procedures of article 14 of the radio regulations. The United States submitted a protocol statement rejecting the article 14 procedure, however, the requirement for coordination, coupled with the continued use of 470 to 512 MHz in Canada for broadcasting, and the use of band 614 to 806 MHz in both Canada and Mexico for the same purpose, makes our use of these bands for the mobile service problematic. A similar situation prevails regarding U.S. proposals for the 902- to 960-MHz band where the United States, Canada, and Mexico use the same segments for competing services and where coordination in border regions may be difficult.

The United States must determine its policies and means to follow through on this declaration. There are no FSS Earth stations currently operating in the 3.4- to 3.6-GHz band. In its declaration, the United States agreed not to withhold support if INTELSAT decided to undertake FSS in that band. If such a decision was implemented, the United States would be under strong pressure to restrain radar operations that might interfere with international satellite operations.

The HF Broadcasting Service

In recent decades, growing numbers of countries have turned to HF (shortwave) broadcasting to carry news, entertainment, comment, and propaganda to audiences beyond their own borders. The potential effectiveness of these broadcasts has been hampered by two factors: 1) the congestion of the shortwave frequency bands by more and more stations with ever-higher transmitter power, resulting in unintentional interference; and 2) jamming—the deliberate interference with broadcast signals.

WARC-79 offered the first opportunity since 1959 for the international community to attempt to alleviate the present congestion in HF broadcasting and the United States went to the conference seeking a substantial expansion of spectrum allocated to this service. The United States did not win approval for all its proposals but the overall outcome was satisfactory from both the technical and political standpoints. As a result of WARC-79, congestion and interference should be reduced considerably by the end of the 1980's and reception of HF broadcasts should be clearer. For the United States, this will benefit the Voice of America, Radio Free Europe/Radio Liberty (RFE/RL), the Armed Forces Radio and Television Service, and several private organizations engaged in HF broadcasting.

To reduce interference and congestion, the conference agreed to an increase of 850 kHz in the HF broadcasting bands between 9 and 21 MHz, including the creation of a new 13-MHz band. This represents an overall increase of 33 percent in the allocation for HF broadcasting. The United States had proposed a 46 percent increase, while the Soviet Union asked for no increase at all. The compromise was the result of an initiative by nonalined countries and it was especially welcomed because the allocation will ultimately become exclusive, although it remains shared until the fixed service operations now using it can be reaccommodated. Despite appeals by the United States and other countries, proposals to expand the important 6- and 7-MHz bands failed by very narrow margins, largely because many developing countries claimed a continued need for these bands for other forms of communication.

WARC-79 also agreed to convene a specialized HF broadcasting conference in the mid-1980's to plan for the more efficient and equitable use of the broadcasting bands, and it tied the bringing into force of the new allocations to the effectiveness of this conference. The United States initially opposed this follow-on conference but switched to support the idea when it became apparent that WARC was running behind schedule and that U.S. interests might suffer substantial damage in the atmosphere of frustration that prevailed.

The United States achieved one goal by keeping open the scope and character of the follow-on conference; the agenda will be open and the meeting does not constitute an assignment or allocation conference. Nevertheless, there are potential problems with this follow-on conference. Political issues, such as "prior consent," could prove troublesome. Also, as noted above, the increased allocations to HF are dependent upon success in accommodating the fixed services that were ousted from the spectrum given to international broadcasting. For this reason, the United States, together with the United Kingdom, Spain, Greece, Saudi Arabia, Cyprus, Sri Lanka, and Zambia in a multinational protocol statement, reserved the right—in the absence of an adequate plan—to take the necessary steps to meet the needs of the HF broadcasting services. Similar independent reservations were made by 17 other countries. (Three host countries for RFE/RL transmitters—West Germany, Spain, and Portugal—were among those taking reservations.)

In an effort to deal with the continued problem of deliberate jamming by the Soviet Union and other Communist bloc countries, the United States made the following protocol statement at the conclusion of the conference:

> Administration of the United States of America, calling attention to the fact that some of its broadcasting in the high frequency bands allocated to the broadcasting service are subject to willful, harmful interference by administrations that are signatory to these Final Acts, and that such interference is incompatible with the rational and equitable use of these bands, declares that for as long as this interference exists, it reserves the right with respect to such interference to take necessary and appropriate actions to protect its broadcasting interests. In so doing, however, it intends to respect the rights, to the extent practicable, of administrations operating in accordance with these Final Acts.

Other smaller countries, like Iran, also complained of Soviet jamming which, although not directed at them, interfered with their broadcasting. Neither the Soviet Union nor any of the other Eastern bloc nations that currently jam U.S. broadcasts submitted an official statement to answer the U.S. complaint.

U.S. delegation representatives who dealt with HF broadcasting issues reported that the nonalined movement countries generally supported or opposed U.S. positions on the basis of their own interests and not for ulterior political motives. Some of the strongest opposition to U.S. proposals came from Latin America, especially on the issue of fixed services v. broadcasting. Brazil and Costa Rica proved to be more influential than Cuba in controlling the Latin American delegations.

The Soviet Union, which often operates HF broadcasting stations "out of band," i.e., using frequencies allotted to some other service, did not request additional HF broadcasting frequencies. However, this may be explained by the fact that the Soviet Union entered a protocol statement in the Final Acts of the 1959 General Administrative Radio Conference regarding HF frequency bands and thus the Soviet Union does not consider their operations "out of band."

National Security Systems

This report deals at length with the consequences to U.S. national security of decisions reached at WARC-79. The extensive treatment is not intended to disparage the importance of WARC for other U.S. interests. It arises, rather, from the peculiar nature of DOD communications requirements and their broad-ranging use of satellites and radiofrequency spectrum.

The Final Acts of WARC-79 represent a generally acceptable compromise that satisfied most U.S. national security needs but will require some significant changes in the coming years. Greater numbers of different operations will have to make use of the same frequency bands; systems will need greater frequency flexibility to cope with competing users of the spectrum. The magnitude and cost of these changes cannot be known for some time; they will be determined in part by the manner in which the new radio regulations agreed on at WARC-79 are actually implemented worldwide.

Without being pessimistic, it should be noted that most of the major reservations that the U.S. delegation took at WARC-79 involved national security considerations. This fact by itself justifies a thorough look at the short- and long-term consequences for U.S. security of decisions reached at the conference.

Military systems must be prepared to operate anywhere in the world, and geographical restrictions on some bands generate additional requirements for frequency flexibility—sometimes demanding costly increased design and operational complexity.

The problem of "universality" is partly solvable through bilateral and multilateral agreements, but there is still a significant impact on system planning and operation. Some military systems are fielded in a less advanced state of development than their civil counterparts. As a result, they must be adjusted more. They are also used in field tests and exercises, and the frequency coordination is an important component of the planning. Nevertheless, advanced technology developments can provide some solutions.

Military-Related Issues and Objectives

The security of the United States depends on economic health as well as defense posture. The following discussion, however, focuses on the major military-related issues and objectives that were identified going into WARC-79:

- Radiolocation (radar)
  - Minimize encroachment of radar bands, below 1000 MHz, especially in the 400- and 800-MHz bands, and at 3.4 and 5 GHz.
- Satellites (radionavigation)
  - Provide for NAVSTAR Global Positioning Satellite (GPS) at 1,227 and 1,575 MHz.
- Satellites (communications)
  - Recognize and provide for MSS.
  - Obtain reasonable sharing criteria for MSS
  - Avoid any a priori plans that would allocate or preposition geostationary orbit spacing.
- High frequency (HF)
  - Insure adequate HF allocations for non-line-of-sight (NLOS) nonsatellite strategic communications, beyond line-of-sight (LOS) tactical communications.
  - Avoid regulatory limitations that would inhibit over-the-horizon (OTH) radars.
- Fixed and mobile (terrestrial)
  - Maintain status quo in the 4400- to

  4900-MHz band, pertinent to NATO requirements.
  - Retain the 14.5- to 15.35-GHz bands for fixed and mobile systems pertinent to NATO requirements, and minimize the growth of the space services in these bands.
- Intelligence
  - Avoid any regulations that limit or reduce flexibility of operation.

One part of the U.S. preparation strategy was to participate in and strengthen the International Radio Consultative Committee (CCIR) of ITU as a technical forum. Toward that end, DOD participated actively in the work of CCIR study groups, the CCIR XIV Plenary held in Kyoto, Japan (June 1978), and in the CCIR special preparatory meeting (SPM) for WARC-79 held in Geneva in October 1978. DOD prepared substantial documentation for SPM in the following technical areas:

- GPS
- Mobile-satellite systems
  - Sharing criteria
  - Coordination areas
- Radiolocation
  - Sharing
  - Signal characteristics
- Mobile sharing with fixed service (HF band)
- Spread-spectrum techniques
- Techniques above 50 GHz.

The documents prepared for the CCIR plenary and SPM by DOD were in most cases adequate technically to support the DOD positions at WARC; however, the decisions ultimately taken at WARC-79 did not necessarily turn on technical data. It should be recognized that CCIR work is a continuing program and future active U.S. and DOD participation is essential.

The results of WARC-79 are provided in the Final Acts, and the overall results as they pertain to the United States have been summarized by Ambassador Robinson and the members of the delegation. The national security impacts have been considered in a report to the Air Force, and DOD has provided a national security assessment to the Senate that will consider the Final Acts for ratification as a treaty. The DOD consensus is that with some exceptions, the WARC-79 outcome did not degrade the national security of the United States. However, it is recognized that costs must increase in the future. Some of the results and an estimate of their impact on national security were apparent immediately after the conference. For example, our national security posture was improved when the United States:

- Obtained provisions in the allocation table that accommodate the NAVSTAR-GPS on a worldwide basis; and
- Obtained provisions for the operation of mobile-satellite terminals at 7 and 8 GHz (although the specific frequency bands are not consistent with the current design and channelization plans for the DSCS [Defense Satellite Communications System] III).

While the United States as an entity minimized its losses due to conference actions, DOD (as a major U.S. international user of the radio spectrum) did bear the brunt of the loss of flexibility for use of the spectrum (e.g., radiolocation). The United States took six reservations, four of which dealt directly and one of which dealt peripherally with decisions that could adversely affect national security.

It should be recognized that the total impact of WARC-79 will take some time to assess due to the interdependence with implementing actions of other nations, particularly those with whom the United States is allied militarily.

Spectrum Availability for National Security

Major national security questions are: "What portions of the radiofrequency spectrum are available for DOD use, and what was the effect of WARC-79 allocation actions on DOD's capability to perform its mission?" There is no simple, single answer to these questions. However, one method of gaining some perspective is to examine the status of the major radio bands and services employed by DOD in the revised table of allocations developed by WARC-79 and compare it with the existing table. The bands below 27.5 MHz and above 15 GHz are treated on a *band* basis; whereas, between 27.5 MHz and 15 GHz the changes are treated on a *service* basis for the fixed, mobile, radiolocation and fixed-satellite and mobile-satellite services. All of these bands and services are vital to U.S. national security. They are used: for example, for command, control, and intelligence systems; for radionavigation; for military weapon systems that use radiosignals for guidance and targeting; for early warning and all forms of communication. Moreover, they must operate in all parts of the world under various conditions of competing spectrum use.

Bands Below 4 MHz

The following changes were made in the bands below 4 MHz:

- The radionavigation service in the very low frequency (VLF) and low frequency (LF) bands was expanded. This was a U.S. proposal for protection of nongovernment and military operations.
- The medium frequency (MF) spectrum for AM broadcasting was expanded to 1605 to 1705 kHz.
- Fixed and mobile operations between 2 and 4 MHz were maintained; however, footnotes and power limitations were specified in an attempt to reduce interference.

The HF Band (4 to 27.5 MHz)

The United States proposed to reduce allocations to the fixed service by 18 percent and reallocate these frequencies to the maritime-mobile, broadcasting, radio astronomy, amateur, and mobile (except aeronautical-mobile) services. While there was only a 14-percent reduction in HF spectrum available to DOD, the exclusive bands were reduced by over 65 percent. The shared use of bands by service was greatly increased. The conference made significant reallocations to maritime (including several new bands above 10 MHz) and to international broadcasting operations. This led, in part, to U.S. reservations. The aeronautical-mobile service bands were not changed. A detailed reaccommodation procedure, whereby services displaced would be provided for elsewhere in the spectrum, was a part of the revised HF allocation agreement. The conference action lessened the number of assignments that may be affected. The time frame for completion of the changeover as specified by the conference further reduces the overall impact on DOD and other HF users. The immediate procedure is for each administration to review all the HF fixed service listings in the international frequency list as furnished by the International Frequency Registration Board (IFRB). This review will:

- Delete entries not required.
- Identify remainder by category, regular operational use, standby, occasional use on a reserve basis.
- Determine hours of operation.

IFRB was to be advised by March 1981 of the administrations' findings. Then, beginning in July 1984, administrations will be required to effect the changeover from the old assignment to a new assignment. For bands above 10 MHz the changeover will be completed by July 1, 1989, and for bands below 10 MHz by July 1, 1994. (Tables 3 and 4 show the distribution of the HF band before and after WARC-79.)

The 20-, 30-, 40-GHz Bands

In the bands at 20, 30, and 40 GHz, virtually all U.S. requirements for FSS and MSS were met, though in certain instances the sharing with other services as agreed by the conference may not prove to be feasible. The MSS proposals in these bands were companion to MSS proposals in the 7- to 8-GHz bands. The successes achieved will strengthen military communications by satellite.

Table 3.—Distribution of the HF Band (4000 to 27,500 kHz) Before WARC-79

Service	Exclusive		Shared		Total	
	kHz	Percent	kHz	Percent	kHz	Percent
Fixed service	10,157	43.2%	4,348	18.5%	14,505	61.7%
Maritime mobile	3,850	16.4	2,202	9.4	6,052	25.8
Land mobile	—	—	4,177	17.7	4,177	17.7
Broadcasting	2,350	10.0	300	1.3	2,650	11.3
Aeronautical fixed and mobile	1,795	7.6	50	0.2	1,845	7.8
Amateur	900	3.8	—	—	900	3.8
Others	116	0.5	—	—	116	0.5

SOURCE: H. A. Feigleson, "High Frequency in the Future," *IEEE Trans. EMC*, vol. 23, No. 3, August 1981, draft.

Table 4.—Distribution of the HF Band (4000 to 27,500 kHz) After WARC-79

Service	Exclusive		Shared		Total	
	kHz	Percent	kHz	Percent	kHz	Percent
Fixed service	3,704	15.8%	8,191	34.9%	11,895	50.7%
Maritime mobile	4,650	19.8	158	0.6	4,808	20.5
Land mobile	—	—	2,120	9.0	2,129	9.0
Other mobile	—	—	6,442	27.4	6,442	27.4
Broadcasting	2,930	12.5	250	0.1	3,180	12.6
Aeronautical	1,815	7.7	80	0.3	1,895	8.0
Amateur	1,300	5.5	50	0.2	1,350	5.7
Others	200	0.8	66	0.2	266	1.0

SOURCE: H. A. Feigleson, "High Frequency in the Future," *IEEE Trans. EMC*, vol. 23, No. 3, August 1981, draft.

Fixed Service

Table 5 is a summary of WARC-79 gains and changes in status on fixed allocations between 27.5 MHz and 15 GHz as reflected in the allocation tables. Between 15 to 40 GHz there were no changes to the fixed service allocation tables; and, above 40 GHz, the gains were extensive—virtually assuring frequency support for DOD fixed requirements above 40 GHz. The table does not show those fixed bands that were unchanged, but does give a measure of the gains made by the fixed service. However, between 1 and 15 GHz, the fixed service gains were made by sharing with the radiolocation and FSS.

Some gains in spectrum allocations for the fixed service are not in DOD's best interests, though the results were expected at the conference. The 420- to 430-MHz and 440- to 450-MHz bands contain important DOD radiolocation systems that are expected to have a long lifetime. These systems will now have to share with the fixed service. The allocation changes imposed by WARC will have a significant effect on the operation of these systems. The allocation of the fixed service on a primary basis to the 7250- to 7300- and 7975- to 8025-MHz bands was also expected (but not welcomed) by DOD. DSCS operates uplinks in the 7900- to 8400-MHz band and downlinks in the 7250- to 7750-MHz band. Airborne satellite communication operations are planned for the 7975- to 8025-MHz band, which was an exclusively allocated satellite band in most of the world prior to WARC-79, although this "exclusivity" was already diluted significantly by footnotes. Coordination of airborne satellite operations in a band with existing fixed systems within the United States has been very difficult. The proliferation of fixed communication systems will exacerbate this problem.

The band 4400 to 4990 MHz, is in heavy use by the military service for tactical communications, including tropospheric scatter operations; and in NATO Europe it has been designated a military band. In 1963, a

Table 5.—Summary of WARC Gains and Changes in Status on Fixed Allocations Between 27.5 MHz and 15 GHz

Frequency band (MHz or GHz)	Region(s)	Bandwidth MHz (nearest tenth) Primary	Secondary	Change MHz	Prior major use of the band
27.5-28 MHz	1	0.5		+0.5	Met aids
41.015-47	1	6		6	BC
54-68	2		14	14	BC
68-72	2		4	4	BC
74.6-74.8	2 and 3	0.2		+0.2	Aero nav
75.2-75.4	2 and 3	0.2		+0.2	Aero nav
76-88	2		12	12	BC
136-138	All		2	+2	Space research
146-148	3	2		+2	AM
174-216	2		42	42	FX MO BC
220-225	2	5		+5	AM RL
230-235	1	5		5	Aero nav
420-430	2 and 3	10		+10	RL
440-450	2 and 3	10		+10	RL
470-512	2		42	+42	BC
470-610	3	140		+140	BC and Rnav
614-890	2	84	192	+276	BC
1435-1525	2	90		90	MO
1530-1535	1 and 3		10	10	Space OPS
1660.5-1670	All	1.6	7.9	+9.5	Met aids
2300-2450	2 and 3	150		150	RL
3300-3400	2		100	+100	RL
3400-3500	2 and 3	100		+100	RL and FX satellites
4990-5000	2	10		+10	Radio astronomy
5850-5925	2	75		+75	RL
7250-7300	All	50		+50	FX satellite
7975-8025	All	50		+50	FX satellite
10-10.45 GHz	1 and 3	450		+450	RL
10.5-10.55 GHz	2 and 3	50		+50	RL
14.3-14.4 GHz	1 and 3	100		+100	FX satellite and nav satellite

SOURCE: Systematics General Corp., "The World Administrative Radio Conference 1979," final report

U.S.S.R. proposal for the inclusion of FSS, Earth-to-space on a primary basis in the band 4400 to 4700 MHz was accepted as part of a conference compromise among the United States, United Kingdom, and the Union of Soviet Socialists Republics. To date there is no known satellite use of this band; however, the INTELSAT intentions to use this band became apparent at WARC-79. This desired use became coupled to negotiations related to the band 3400 to 3700 MHz. In order best to protect current known operations in the band, FSS was shifted to 4500 to 4800 MHz (sharing with the fixed and mobile services), and its direction was changed to space-to-Earth. The bands 4400 to 4500 MHz and 4800 to 4990 MHz remain primarily fixed and mobile, except that in the subbands 4825 to 4835 MHz and 4950 to 4990 MHz the aeronautical-mobile service is excluded.

Mobile Service

The summary of WARC-79 gains, losses, and changes in status on mobile allocations between 27.5 MHz and 15 GHz is given in table 6. As can be noted, the differences between tables 5 and 6 are minor, and many of the comments concerning the fixed service changes apply to the mobile service. While the mobile service has several reductions in the status of the service, it suffered no loss of a band.

Radiolocation (Radar)

In the United States, the radiolocation service provides the spectrum support for

Table 6.—Summary of WARC Gains, Losses, and Changes in Status on Mobile Allocations Between 27.5 MHz and 15 GHz

Frequency band (MHz or GHz)	Region(s)	Bandwidth MHz		Change MHz	Prior major use of the band
		Primary	Secondary		
27.5-28 MHz	1	0.5		+0.5	Met aids
41.015-47	1	6		6	BC
54-68	2		14	14	BC
68-72	2		4	4	BC
74.6-74.8	2 and 3	0.2		+0.2	Aero nav
75.2-75.4	2 and 3	0.2		+0.2	Aero nav
76-88	2		12	12	BC
100-108	1	8		-8	BC
136-138	All		2	+2	Space research
146-148	3	2		+2	AM
174-216	2		42	42	FX MO BC
220-225	2	5		+5	AM RL
230-235	1	5		5	Aero nav
420-430	2 and 3	10		+10	RL
440-450	2 and 3	10		+10	RL
470-512	2		42	+42	BC
470-610	3	140		+140	BC and Rnav
614-960	2	110	236	+346	BC FX RL
862-960	1	98		+98	BC FX
1660.5-1670	All	1.6	7.9	+9.5	Met aids
2300-2450	2 and 3	150		150	RL
3300-3400	2		100	+100	RL
3400-3500	2 and 3		100	+100	RL and FX satellites
3400-3600	1		200	200	FX and FX satellites
4990-5000	2	10		+10	Radio astronomy
5850-5925	2	75		+75	RL
7250-7300	All	50		+50	FX satellite
7975-8025	All	50		+50	FX satellite
10-10.45 GHz	1 and 3	450		+450	RL
10.5-10.55 GHz	2 and 3	50		+50	RL
11.7-12.5 GHz	1		800	800	FX BC and BC satellites
11.7-12.1 GHz	2		400	400	FX FX satellite BC satellite
14.3-14.4 GHz	1 and 3	100		+100	FX satellite nav satellite

SOURCE: Systematics General Corp., "The World Administrative Radio Conference 1979," final report

certain Government operations—principally military radars. Frequency management for this service, including assignments, coordination, etc., is under the jurisdiction of the National Telecommunications and Information Administration (NTIA) but operational responsibility is with DOD and the Federal Aviation Administration. As such, radiolocation proposals and associated position papers were generated in DOD with the aims of national security in mind. It should be noted that radar systems for different purposes and with different technical characteristics and operational requirements are used by many other telecommunication services and are administered by other agencies. Thus, radionavigation radars generally fall under the operational purview of the Department of Transportation, meteorological radars under the Department of Commerce, and Earth exploration satellite radars with the National Aeronautics and Space Administration. Nongovernment radar users are regulated by FCC.

It should be noted further that not all systems in the radiolocation service are radar systems. These other systems include highly accurate, position-fixing systems similar in principle to the Loran and Omega hyperbolic radionavigation systems. Used for surveying purposes such as offshore oil exploration, these systems are technically navigation devices but have been traditionally operated in the radiolocation service, using its frequency allocations and subject to its technical standards. The existing allocation for radiolocation (and the proposals to retain them) have a firm foundation in the technical aspects of radio wave propagation and radar system missions.

During the preparation for WARC, problems were foreseen in three major areas involving seven different bands. Problems in the UHF band were deemed particularly important because this is the frequency range best suited for the long-range, air-surveillance mission. Prior to WARC-79, a worldwide primary allocation existed for radiolocation in the band 430 to 440 MHz, while in regions 2 and 3 it extended from 420 to 450 MHz. It was known that there would be intensive pressure for allocation of these bands to the fixed and mobile services. The U.S. position, therefore, was to retain at least the existing worldwide primary allocation and acquiesce to secondary status in the adjoining bands, if necessary. WARC did, in fact, arrive at this result along with a reduction to secondary status in the 890- to 942-MHz band. By country footnote, the United States retained a primary allocation for itself in those bands where the status had been reduced. It is the position of DOD that the radar system using these bands have sufficient flexibility to perform their mission. All of the systems involved have some modes of operation that could create undesirable interference. However, the retention of primary status in the United States will provide sufficient training opportunities to maintain operator proficiency in these modes. The WARC results fell reasonably within the U.S. fall-back position in these bands until the fixed and mobile footnotes started mounting up. Unable to control the flood of countries participating in these footnotes, the United States entered the reservation contained in Protocol Statement No. 38.

Of the three bands noted as problem areas in the fixed-satellite and radar sharing area, only the 3.5-GHz band was a serious problem. The 17.5-GHz band will require further study but raises no immediate hardships, and the anticipated problems at 5.5 GHz never materialized. The U.S. proposal contained provisions to meet the well recognized need for additional bandwidth for FSS in the frequency bands below 10 GHz. At the same time, the United States was committed to retaining spectrum support for major military radar systems in the 3.4- to 3.6-GHz band. Predictions of pressures to turn this band over to FSS were indeed fulfilled at WARC. The intensive, and sometimes acrimonious, negotiations included at one time the submission of a proposed footnote by the United States that would exclude FSS in the United States from operating in the 3.4- to 3.7-GHz band. The final result was a compromise; a compromise achieved by the removal of any mandatory requirement to stop radar operations in the band. In addition to the allocation status defined in the table of allocations and the footnotes, a declaration was signed by several members of INTELSAT (the United States included) that says, in part, "they shall make reasonable effort to accommodate FSS." Thus the status of radiolocation was retained, but with the foreknowledge that the pressure from the fixed-satellite community, both internal and external to the United States, would continue.

In the 17.3- to 17.7-GHz band, the secondary status for radiolocation was part of the U.S. fallback position because of the very limited current use of the band by radar systems. By footnote, WARC-79 decreed that the band could be used for broadcast satellite uplinks, and this action was acceptable to the United States. With such usage, further study may show that radiolocation operations are possible with an acceptably low probability of interference.

The United States was well aware of the spectrum crowding occurring in the radionavigation bands and had made several proposals to alleviate it. Proposals from other countries sought to temper the problem by combining radionavigation and radiolocation into a common service—radio-determination—or by adding radionavigation as a coequal sharing partner with the radiolocation service. In addition to adopting some of the U.S. proposals for beacons, transponders and the like, WARC opted for making radionavigation an equal partner. However, WARC came painfully close to defining aeronautical and maritime radionavigation as safety services, an action that would have included these services in the regulation regarding harmful interference to safety services. This action may be interpreted to give preferential status to the radionavigation service and bodes ill for the equality of the partnership. The U.S. recognition of this state of affairs is contained in the reservations taken in the affected bands in Protocol No. 38.

The radiolocation portion of the U.S. proposals to the WARC sought the following four major items:

1. retain radiolocation allocations in all existing bands except 216 to 225 MHz;
2. provide adequate provision for radiolocation above 40 GHz;
3. include allocations for space radar; and
4. provide worldwide primary allocations for high-accuracy, position-fixing radiolocation systems between 1615 and 3400 kHz.

In a strictly literal sense, all four objectives were met. From a practical point of view, however, only items 2, 3, and 4 can be claimed as truly successful. Concerning the first point, the existing radiolocation allocations were indeed retained, but the addition of other services on a primary basis will have a significant effect on the design, development, performance and operations of radiolocation systems operating between 400 MHz and 40 GHz.

Item 1.—Table 7 compares the status of the radiolocation allocations between the existing radio regulations and those created by the Final Acts of WARC-79, indicating in the final column the changes that were made in the table of allocations. It is seen that the status of radiolocation was reduced in six bands. In all of these bands, pre-WARC negotiations had indicated that pressure for reductions was likely to be heavy. Consequently, fallback positions were prepared and, with one exception, adhered to during WARC. The one exception was in the 890- to 942-MHz band where radiolocation was reduced to a secondary service in region 2. This reduction was mitigated by the addition of footnote 3669A, which provides primary status to this service in the United States. The footnote was weakened by Canada's insistence on making the footnote subject to the procedures of article N13A. This amendment was unacceptable to the United States and formed the basis for a portion of the bands covered by the reservation noted in paragraph 4 of Protocol Statement No. 38 (which deals with the larger band 890 to 960 MHz). Thus, the objective of retaining radiolocation allocations has been met and, as such, continues to make available the frequencies required for the development and operation of radiolocation systems in the United States.

Not apparent from table 7, however, is a host of key decisions with respect to four other services that will greatly affect the radiolocation service. These four services are the fixed and mobile services (which will be discussed as a pair), the radionavigation services (including the aeronautical and maritime radionavigation service), and FSS.

The decisions made for the fixed and mobile service involved inserting these services by footnote in virtually every radiolocation band (as well as in bands for other services) between 420 MHz and 36 GHz. The footnotes are the so-called "country footnotes" in which each country claims band usage for a service that is in addition to or alternative to the service stated in the table of allocations itself. On the average, about 25 percent of the member nations of ITU are involved in these footnotes; however, over 40 percent of the member countries are involved in the band 430 to 440 MHz. A precedent for these country footnotes did exist in the previous radio regulations but the number of countries involved was small, generally less than 10 in a given band. These few exceptions were quite manageable in terms of worldwide

Table 7.—Pre- and Post-WARC Radiolocation Allocations

			Bandwidth - MHz				
			Primary		Secondary		
	Frequency band	Region	Old	New	Old	New	Change
	216-225 MHz	1	—	—	—	—	NOC
		2	9	—	—	9	↓ 9
		3	—	—	9	7	– 2
†	420-450 MHz	1	10	10	20	20	NOC
		2	30	10	—	20	↓ 20
		3	30	10	—	20	↓ 20
†	890-942 MHz	1	—	—	52	52	NOC
		2	52	—	—	52	↓ 52
		3	—	—	52	52	NOC
	1215-1400 MHz	1	135	135	50	50	NOC
		2	135	135	50	50	NOC
		3	135	135	50	50	NOC
	2300-2500 MHz	1	—	—	200	200	NOC
		2	200	200	—	—	NOC
		3	200	200	—	—	NOC
	2700-3400 MHz	1	300	300	400	400	NOC
		2	300	300	400	400	NOC
		3	300	300	400	400	NOC
	3400-3700 MHz	1	—	—	200	200	NOC
		2	300	(200) +	—	300	↓ 300
		3	300	(200) +	—	300	↓ 300
†	5250-5925 MHz	1	300	300	300	300	NOC
		2	375	300	300	375	↓ 75
		3	300	300	375	375	NOC
†	8.5-10.0 GHz	1	1100	1100	400	400	NOC
		2	1100	1100	400	400	NOC
		3	1100	1100	400	400	NOC
†	10.0-10.68 GHz	1	500	500	180	180	NOC
		2	550	550	130	130	NOC
		3	550	550	130	130	NOC
†	13.4-14 GHz	1	600	600	—	—	NOC
		2	600	600	—	—	NOC
		3	600	600	—	—	NOC
†	15.7-17.7 GHz	1	2000	1600	—	400	↓ 400
		2	2000	1600	—	400	↓ 400
		3	2000	1600	—	400	↓ 400
	24.05-24.25 GHz	1	200	200	—	—	NOC
		2	200	200	—	—	NOC
		3	200	200	—	—	NOC
†	33.4-36 GHz	1	2600	2600	—	—	NOC
		2	2600	2600	—	—	NOC
		3	2600	2600	—	—	NOC

†	U.S. reservation
–	Lost bandwidth
↓	Status reduced
+	See text
NOC	No change

SOURCE: Telecommunications Systems Inc.

operations. Now, however, the exceptions can become extremely difficult with the expected proliferation of the fixed and mobile services. The difficulty will be particularly severe for airborne radar operations because the large LOS distances these signals travel when aircraft are at high altitudes can cause interference over large areas extending into other countries.

Because of this incompatibility between the fixed and mobile services on the one hand and radiolocation service on the other, the United States entered reservations to the Final Acts in Protocol Statement No. 38 for the frequency bands 430 to 440 MHz, 5650 to 5850 MHz, 8500 to 8750 MHz, 10,000 to 10,500 MHz (where the fixed and mobile services were added as a primary service in the table of allocations rather than by footnote), 13.4 to 14 GHz, 15.7 to 17.3 GHz, and 33.4 to 36 GHz. Fixed and mobile footnotes were also included in the bands 1215 to 1300 MHz and 3300 to 3400 MHz, but some mitigating circumstances precluded the need for U.S. reservations.

In the band 1215 to 1300 MHz, one-third of the countries present in the fixed and mobile footnote are also represented in a radionavigation footnote for the same frequency band. It was felt that the fixed and mobile usage would not be so severe as to warrant a U.S. reservation. In the 3300- to 3400-MHz band a clause was inserted in the footnote that negates the primary status of the fixed and mobile services in the regions around the Mediterranean Sea. It was felt that this was sufficient to obviate a need for a reservation in this band.

A second key decision was made in connection with the radionavigation services. The decision here was to add maritime radionavigation as a primary service in the radiolocation bands 8850 to 9000 MHz and 9200 to 9300 MHz, and to add radionavigation as a primary service in the band 9500 to 9800 MHz.

The third key decision concerned FSS in the band 3400 to 3700 MHz. The existing radio regulations showed that the radiolocation and FSS would share this band equally at least in regions 2 and 3. In the U.S. national table of allocations, the band was alloted to (and in use by) the radiolocation service. Studies conducted in preparation for WARC showed that the specific systems being used by these services could not share the band. On the basis of the radar system usage, the U.S. position was to retain radiolocation as a primary service with the provision that a part of the band could be made available to support fixed-satellite communications.

This position was steadfastly maintained through a protracted period of intense negotiations at WARC. The final result did, indeed, reduce radiolocation to a secondary service in the table of allocations, but, by footnote, primary status was restored in regions 2 and 3 over the band 3400 to 3600 MHz. The footnote contains a directive for administrations to take all practical steps to protect FSS after 1985 along with a nonbinding plea for radiolocation systems to cease operations by the same year. As part of the compromise, a formal declaration was signed by the United States, Canada, the United Kingdom, the Netherlands, Australia, and Belgium vowing to make reasonable effort to accommodate FSS in the band. The national table of allocations, currently under development jointly by FCC and IRAC, will make limited allowance for FSS in the band 3600 to 3700 MHz with the remainder of the band being retained in the radiolocation service.

In the FCC's third notice of inquiry concerning implementation of the Final Acts of WARC-79 (Docket 80-739), the FSS allocations in the bands 3.7 to 3.7 GHz and 4.5 to 4.8 GHz are proposed to be limited to international satellite systems and excludes domestic satellite systems. According to the third notice of inquiry, the expectation is that no more than one Earth station on each U.S. coast can be successfully coordinated with stations operating in the radiolocation service.

Item 2.—WARC-79 presented the first opportunity to allocate the frequency bands above 40 GHz to terrestrial services. The U.S. radiolocation position in this frequency range was to obtain four primary bands and three secondary bands primarily in the regions of reduced atmospheric absorption, the so-called "propagation windows." WARC allocated six primary bands and four secondary bands. A comparison of the U.S. proposals with the WARC action is shown in table 8. It is clear that there is adequate frequency support for radiolocation system development in these bands.

Item 3.—Prior to WARC-79 there was no provision for spaceborne radars in the radio regulations. The matter has been rectified by the WARC-79 action of permitting spaceborne radars in every radiolocation band between 1 and 36 GHz as well as the band 78 to 79 GHz. The U.S. proposal was to accommodate space radars on a secondary basis in the bands below 14 GHz and on a primary basis above 14 GHz regardless of the service that was employing the radar systems. The actual wording in the WARC-79 footnotes provides secondary status to space radiolocation systems in all the radiolocation bands from 1 to 14 GHz and in the band 35.5 to 35.6 GHz it has primary status. Radars used in the Earth-exploration satellite service have primary status in the bands 35.5 to 35.6 GHz and 78 to 79 GHz, with secondary status in all the radiolocation bands from 1 to 24.25 GHz. Thus, the status of spaceborne radiolocation systems is considerably enhanced from that which existed prior to WARC-79.

Table 8.—Comparison of WARC Radiolocation Allocations and U.S. Proposed Allocations Above 40 GHz

Bands in U.S. proposal (GHz)		Bands allocated (GHz)	
—		59-64	Primary
76-81	Primary	76-81	Primary
92-95	Primary	92-95	Primary
95-101	Secondary	95-101	Secondary
—		126-134	Primary
142-150	Secondary	134-142	Secondary
165-170	Primary	144-149	Primary
221-229	Secondary	231-235	Secondary
		238-241	
240-250	Primary	241-248	Primary

SOURCE: Telecommunications Systems Inc

Item 4.—It was the U.S. objective to obtain more substantial frequency support for the accurate position-fixing systems in the MF band. While WARC did not provide a common, worldwide band for these nonradar radiolocation systems, it did provide primary status over 30 kHz in region 1, 245 kHz in region 2, and 193.5 kHz in region 3 coupled with secondary status over 80 kHz in region 2 and 200 kHz in region 3.

Reservations

The U.S. reservations on radiolocation matters, noted above, were contained in the initial set of reservations filed by various administrations in the Final Protocol of December 3, 1979. About 20 of the 51 reservations submitted contained a statement by the submitting government that it would take the steps necessary to protect its interests in the event of noncompliance with or reservations to the Final Acts by other administrations. The following day, 32 additional reservations were entered, 24 of which contained similar statements. Three of those twenty-four made specific mention of the U.S. Reservation No. 38.

The reservation by the United States contained in paragraph 4 of Protocol Statement No. 38, relating to the 890- to 960-MHz band will, in all probability, cause a problem along the U.S. borders primarily relating to nongovernment operations. The issue will become one of the many topics for discussion and negotiation in the future U.S. bilateral meetings on telecommunication matters with Canada, Mexico, and other nearby countries. The reservation merely places these countries on notice that the United States will coordinate its usage of the band but will not seek agreement prior to making assignments. Although radar users must protect nongovernment operations in this band, one reason agreements will not be sought is that U.S. radiolocation usage involves the newest long-range surveillance radar in operation by the Navy, as well as another Navy surveillance radar now in the advanced development stage.

The reservations involving the bands where radionavigation was added as a primary service along with radiolocation (8500 to 9000, 9200 to 9300, and 9500 to 9800 MHz) can, if not forestalled, result in long-term, worldwide problems. Radar usage by the radiolocation service is extremely heavy in the radiolocation bands between 8500 and 10,000 MHz. The addition of the radionavigation service and the multicountry fixed and mobile footnotes in this band have taken 900 MHz of virtually exclusive radiolocation in the current radio regulations and added one or more primary services over the entire band. Technical and administrative solutions must be sought if radiolocation is to retain its effectiveness. Some effective technical solutions were proposed to the 1978 CCIR special preparatory meeting by the United States and the United Kingdom. Study of the technical solutions to radiolocation-radionavigation sharing needs to be pursued in CCIR. A more immediate solution, albeit partial, could be found administratively.

The U.S. International Radio Advisory Committee (IRAC) has shown no inclination to add radionavigation to the national table of allocations. IRAC might examine the matter more thoroughly and develop a set of recommendations for use by the State Department in discussions with other countries. The recommendations should propose an orderly introduction of radionavigation on an "as-needed" basis rather than throwing the bands open to any and all navigation use. The intent would be to buy time for the introduction of technical solutions. In the absence of such a planned introduction, the radiolocation service may soon find itself having a de facto secondary status because of the safety-of-life aspects of the radionavigation service.

The insertion of multiple country fixed and mobile footnotes into the table of allocations threatened chaos for many services. Through strenuous efforts by the United States, Brazil, and other countries, the situation was eased for some "passive" services (Earth-exploration satellite, space research, and radio astronomy) and the meteorological aids service. Radiolocation did not fare as well. Although many countries deplored these footnotes as being counter to the development of a rational table of allocations, the United States was the only country to act on them. The action noted in paragraph 3 of Protocol No. 38 indicated that the United States, in the operation of radiolocation stations, will not guarantee protection to, nor coordination with, other services. The action was necessary because the existence of the fixed and mobile footnotes in every radiolocation band between 1 and 40 GHz jeopardized all radars operating to serve national defense. Straightforward as it is with regard to the interference radars might cause to other services, the U.S. reservation contains the implicit statement that the radars can operate in the presence of interference from fixed and mobile emitters. All radars are designed to be operated in the presence of interference, either purposeful or accidental. The degree to which these interference rejection techniques will have to be improved and used depends on how extensively other countries introduce fixed and mobile services in these bands.

This implementation is not expected to occur equally in all the bands to which the footnotes have been added primarily due to economic considerations. However, early implementation is expected in the bands around 1 GHz and below where economical hardware already exists for fixed and mobile applications.

The U.S. reservations in Protocol No. 38 contain the only specific reference to the radiolocation service. Of the remaining protocol statements, a few are political, many deal with specific bands and services, and the majority contain protective clauses indicating that the country or countries submitting the protocol will take necessary action in the event that other signatories abrogate the Final Acts. Only three protocol statements mention No. 38 and even in those cases the concern seems to be more with the 6- and 7-MHz bands than with radiolocation. Thailand, in Protocol No. 60, notes that it will allocate the band 435 to 438 MHz to the mobile, except aeronautical-mobile, service on a primary basis. Thus, while there is no specific threat to the radiolocation service, the mechanism is in place for electronic and political harassment should any country decide on this course of action.

Radar Spectrum Availability and Costs

The availability of spectrum for the radiolocation service had been significantly increased below 200 MHz and above 40 GHz and has remained virtually intact between these two frequencies. The principal benefit is that the new table of allocations (including the footnotes to the table) in the radio regulations continue to provide basic allocations for radiolocation service in all the currently used bands as well as some new bands.

Of equal importance is the retention in the United States of a primary status (by footnote) for radiolocation in the bands 420 to 430, 440 to 450, and 890 to 942 MHz. It is in these bands, which were reduced to secondary status in the table of allocations, that the United States has, and is developing, sophisticated surveillance radars. While these radars have operational modes suitable for worldwide use in a secondary status, the footnotes will provide the opportunity for exercising all modes of operation at U.S. training sites. The results of WARC have, therefore, done little to reduce the spectrum available for radar operations.

Adequacy of spectrum availability notwithstanding, the costs of radar development and operation must increase as a result of WARC-79. The increased costs will be associated with additional needs for operational frequency flexibility, development, and procurement of hardware for interference-free operation while retaining existing performance, and increased participation in international forums such as CCIR.

Frequency management is a continuing task, occupying staff people at the headquarters and unit level. Internationally, frequency managers ensure equitable allocations for various services as dictated by national needs; at the national level, they allot the allocated frequencies as appropriate to national usage; at the unit level, they assign frequencies in accordance with the local conditions. At all levels there is the need to deal with the incidence of interference. It is clear that all of these functions as applied to the radiolocation service will increase because of the additional services added by WARC to the radiolocation bands.

New coordinating activities must now take place between the radiolocation service and the fixed, mobile, Earth-exploration satellite, space research, radio astronomy, aeronautical radionaviagation, maritime radionavigation, radionavigation, and FSS. These activities are expected to be particularly heavy as the allowed usage in the fixed, mobile, and radionavigation bands are implemented. Significant numbers of interference incidents are also expected in these bands entailing the development of techniques to eliminate or reduce this interference.

As noted earlier, all military radars are designed to operate in the presence of intentional (jamming) and unintentional (interference) signals. Numerous electronic counter-countermeasure (ECCM) techniques are incorporated into systems to reduce the effects of unwanted electromagnetic emissions. However, ECCM is not a panacea for interference problems. In this regard, a few comments on radars, ECCM, and interference are in order.

First, radar performance is measured in terms of a clear radiofrequency environment with no interference present. Most ECCM techniques involve some performance degradation. For this reason, a particular ECCM should be used only when it is needed. Of course, when interference is present, ECCM will improve system performance but will generally not bring it back to its clear environment performance. Second, ECCM techniques are largely signal-specific. Thus, a radar will have several techniques to be able to continue to operate in a changing radiofrequency environment. Not all techniques are compatible so that use of one may preclude the use of another. When multiple techniques are used, the performance degradation due to each is cumulative. And third, radar emissions, which generate interference into other services, are seldom considered as part of an ECCM package.

These factors when coupled with the expected proliferation of radiolocation band usage by other services means that radiolocation systems will spend more time with ECCM circuits operating and, through their radiofrequency emissions, be interfering with more systems in other services. In the short term, the need for extensive modifications to existing systems is not anticipated. However, planning should begin now for necessary modifications to radars operating in the frequency bands where the United States took a reservation. In the long term, development work on new and existing systems will have to be increased to ensure mission-fulfilling performance in the presence of increased interference. This additional development work should concentrate both on keeping unwanted signals out of the receiver and on reducing the level and direction of unnecessary ("spurious") emissions coming from the radar. This represents more than just an incremental increase in the ECCM budget of radar development, since performance in the presence of the "friendly" interference should equate to the current performance in a clear environment. The increase may range from 5 to 15 percent depending on the type of radar and the proliferation of the other services in the radar bands.

The third cost increase derives from a need for radar developers to expand their participation in CCIR. This expansion is extremely important in light of the many new sharing situations created by WARC. Prior to WARC, CCIR participation was considered relatively unimportant by radiolocation users since there was little sharing or interaction with other services. During preparations for WARC, it became apparent that the many exclusive bands employed by the radiolocation service would be reallocated or shared. Because of this likelihood, representatives of the radiolocation service participated in the IRAC preparing for the WARC-79 AD Hoc 144 and CCIR study group activities, served as members of the SPM delegation, and were part of the U.S. delegation to WARC.

This representation should continue at CCIR in order to establish a sound and consistent technical background for radar topics in the reports of CCIR plenary meetings (the CCIR Green Books). The absence of this technical basis may have been part of the reason that radiolocation received little support at WARC-79. The representation should consist of not only headquarters policy personnel but also scientists and engineers from Government laboratories and from Government contractors. Perhaps CCIR participation should become a "line item" in the budget of every radar system development. And CCIR should not be the only involvement. Future ITU conferences dealing with specific services and specific regions will continue to have an effect on radiolocation matters. It would be prudent to have radar expertise at these meetings as well.

Fixed-Satellite and Mobile-Satellite Services

Table 9 provides a summary of WARC-79 gains and changes in status on fixed and mobile satellite allocations above 27.5 MHz as reflected in the allocation tables. The data in the bandwidth and change columns illustrates that all the changes in the FSS and

Table 9.—Summary of WARC Gains and Changes in Status on Fixed- and Mobile-Satellite Allocations Above 27.5 MHz

Type of satellite	Frequency band (MHz or GHz)	Region(s)	Bandwidth MHz		Change MHz	Prior major use of the band
			Primary	Secondary		
MO	608-614 MHz	2		6	+6	BC
MO	1544-1545	All	1		+1	Aero mobile satellite
FX	5850-5925	2	75		+75	RL
FX	6425-7075	All	650		+650	FX MO
FX	10.7-10.95 GHz	All	250		+250	FX MO
FX	11.2-11.45	All	250		+250	FX MO
FX	12.1-12.3	2	200		+200	FX MO and BC
FX	12.75-13.25	All	500		+500	FX MO
FX	14.5-14.8	All	300		+300	FX MO
FX	17.3-17.7	All	400		+400	RL
MO	19.7-20.2	All		500	+500	FX satellite
FX	27-27.5	2 and 3	500		+500	FX and MO
MO	29.5-30	All		500	+500	FX satellite
FX	30-31	All	1000		+1000	FX satellite
FX	37.5-39.5	All	2000		+2000	FX and MO
FX and MO	39.5-40.5	All	2000		+2000	FX and MO
FX	42.5-43.5	All	1000		+1000	BC satellite
MO	43.5-47	All	3500		+3500	Various MO satellites
FX	47.2-50.2	All	3000		+3000	Not allocated
MO	50.4-51.4	All		1000	+1000	FX satellite
MO	66-71	All	5000		+5000	Various MO satellites
FX and MO	71-74	All	3000		+3000	Not allocated
FX	74-75.5	All	1500		+1500	Not allocated
FX and MO	81-84	All	3000		+3000	Not allocated
MO	95-100	All	5000		+5000	Various MO satellites
MO	134-142	All	8000		+8000	Radio astronomy
FX	149-150	All	1000		+1000	Various MO satellites
FX	152-164	All	12000		+12000	Not allocated
MO	190-200	All	20000		+20000	Various satellites
FX	202-217	All	15000		+15000	Not allocated
FX	235-236	All	1000		+1000	Radio astronomy
FX	238-241	All	3000		+3000	Radio astronomy
MO	252-265	All	13000		+13000	Various satellites

SOURCE: Systematics General Corp., "The World Administrative Radio Conference 1979," final report, vols. I and II.

MSS allocations were positive and generally provided primary service status. The impression that everything went well for FSS and MSS (and for DOD satellite interests) does not reflect the full implications of WARC-79 decisions. There may be problems in satisfying the DSCS requirements in the 7- to 8-GHz band. DOD's WARC-79 initial goal for satellite operations was to increase the two partially exclusive 50-MHz FSS bands to 125 MHz for both fixed-satellite and mobile-satellite communications, and to add mobile-satellite as a secondary service in the two 500-MHz FSS bands 7250 to 7750 MHz and 7900 to 8400 MHz. Footnote 3764B was added to the table of allocations that authorized the bands 7250 to 7375 MHz (space-to-Earth) and 7900 to 8025 MHz (Earth-to-space) for use by MSS (subject to agreement obtained under the procedure set forth in article N13A)—a major gain. An additional footnote 3762B does not permit aircraft stations to operate in the 8025- to 8400-MHz band in region 2. So, although the goal of 125 MHz for up and downlinks for fixed-satellite and mobile-satellite communications was achieved, this meant that the partial exclusivity that existed for FSS was lost in the two 50-MHz bands (7250 to 7300 MHz and 7975 to 8025 MHz). The DOD plans for use of ground-mobile forces (transportable) and airborne satellite terminals in the United States, NATO countries, and in selected areas of the Pacific must take account of the WARC-79 decisions. Frequency support for these types of DSCS operations will require long lead times to coordinate with host administrations.

The coordination requirements for mobile-satellite use in the 235- to 399.9-MHz band have become more complex due to WARC-

79. Previously, under footnote 3618/308A, the use and development of this service was only subject to the agreement among the administrations concerned and those having services operating in accordance with the table, which may be affected. Now the modified 308A (3618) requires two conditions to be fulfilled:

- Agreement must be obtained under the procedure set forth in article N13A.
    - Under this article agreement among administrations now becomes more complex due to increased data to be furnished—and adding IFRB to the coordination process.
- Stations in MSS do not cause harmful interference to those of other services operating (or planned to be operating) in accordance with the table.

The United States and most NATO countries took a reservation in the final protocol against this second provision on the basis that this imposes a condition of noninterference that could lead to a request to cease operation of a previously coordinated satellite system in the case where an administration, despite having agreed to such a satellite system, puts into service (or merely plans) a system that might receive harmful interference.

Costs Pertinent to National Security

Costs have been discussed earlier in this report. Summarized here are the cost impacts of WARC-79 from the standpoint of national security. There is no major immediate cost impact of WARC-79 regarding national security systems. No heavily used equipment must be moved to another band or phased out and no expensive retrofits are required to existing DOD equipment because of WARC-79 actions. Three reasons explain this lack of immediate cost impact:

- frequency flexibility of existing U.S. equipment;
- success of the U.S. delegation at WARC-79; and
- reservations taken by the United States.

It should be emphasized that there will be future costs resulting from the actions at WARC-79. The nature of these costs are varied. The military, in particular, is affected by the number of footnotes (about 500) to the table of frequency allocations that make it impossible in some cases to know which countries will use which frequency bands for which services. Attempting to design military systems and plan operations on a worldwide basis with such uncertainty will increase system costs and decrease operational flexibility. This means, among other things, that system planners will need to design military systems that have the flexibility to operate in several different frequency bands. The extent of the changes and the magnitude of the costs associated with WARC-79 decisions will not become clear for some time. Discussions between the United States and other countries—particularly our NATO allies—about implementation plans will help clarify the future operating environment.

WARC-79 resulted in a large number of future conferences and DOD should actively participate in the preparation for national and international meetings pertinent to these conferences—including the activities of CCIR—to ensure that DOD spectrum needs are accommodated and that our national security interests are protected. DOD should also provide technically knowledgeable, experienced (and, to the extent possible, multilingual) members to the U.S. delegations. Of the three world conferences and seven regional conferences recommended in the Final Acts of WARC-79, the most important from a national security standpoint are:

- World Administrative Radio Conference on the Geostationary Orbit and the Planning of Space Services (1985 and 1987); and
- World Administrative Conference for Mobile Services (1983).

Mobile services were popular with the developing nations, and, with little regard for the technical aspects of sharing between different radio services, many additions were made to the table of frequency allocations in support of these services. The conference added many provisions impacting radar and weapon system frequency bands, both for terrestrial and satellite operations.

The overall DOD impact of these and other changes related to sharing will be a greater need for U.S. planners, managers, equipment suppliers, and operational forces to be aware of frequency band limitations, and a need to ensure better system development review to understand how U.S. systems can live with those of other countries. These changes add up to one thing for DOD—increased costs. These include: costs associated with additional needs for operational frequency management; costs associated with the development and procurement of the more sophisticated equipment (e.g., increased tunability) needed to permit interference-free operations with other services in the same band; and costs associated with proving the system is compatible, such as electromagnetic compatibility (EMC) studies. And there will be increased costs of coordination with our allies. Other costs may become apparent over time (e.g., as the HF reaccommodation takes effect in the coming years).

Summary of the National Security Impact of WARC-79

The major DOD-related issues and objectives were enumerated earlier. Here is a summary of the major impacts on those issues and objectives. Before beginning a more detailed summary, however, it should be reiterated that in general the national security interests of the U.S. were not endangered by WARC-79 actions. Nevertheless, continued active participation by DOD in the planning and conduct of future discussions and conferences will be required to ensure that follow-on actions to WARC-79 do not jeopardize national security. This will require adequate budget support.

Radiolocation (Radar).—The service retained almost all of its allocations above 200 MHz; the only actual reduction of allocation to the radiolocation service occurred in the 216- to 230-MHz band in region 3. This occurred when 9 MHz of a secondary allocation (216 to 225 MHz) was reduced to 7 MHz (223 to 230 MHz). When considering the magnitude of spectrum allocated for radiolocation use, this reduction of 2 MHz is minor. Consistent with the U.S. proposals, radiolocation was reduced to a secondary service—except that in region 2 (the Americas) it will be on a primary basis until 1990 after which no new stations are to be authorized. However, significant loss in radiolocation status resulted from WARC-79 in certain radiolocation bands below 20 GHz. This loss of status plus the movement of other users into the bands combined to force the United States to take a reservation (No. 38) affecting certain radiolocation bands.

Although there was little actual loss of allocations, the provisions for radar were probably changed more by WARC-79 than for any other single radio operation. For example, in the band 3400 to 3600 MHz, there are provisions for radar to operate worldwide, but radar users must afford some measure of protection to satellite and radio relay operators. The United States operates the Airborne Warning and Control System (AWACS), the Navy's AEGIS, and several other systems of importance to DOD (e.g., missiles, air traffic control, air surveillance, etc.) in the band 2900 to 3700 MHz, and their operations may be affected through the need for added planning coordination. If there is extensive implementation of satellite communications in this band below 3600 MHz, then the problems mentioned above would be compounded—especially in Europe. The radiolocation service lost some exclusivity in the band 8500 to 10,000 MHz where DOD operates navigation, air search, fire control radars, and various airborne systems. When footnotes are considered, radiolocation effectively lost exclusivity over the whole band (8500 to 10,000 MHz). This could eventually place constraints on radar operations and increase demands on system designers. Short-term relief is provided by Protocol Statement No. 38, and intermediate term relief can be negotiated with U.S. allies through bilateral and multilateral agreements outside of the radio regulations. Nevertheless, radar as it currently operates will become increasingly unwelcome in many parts of the world, and new design and operational strategies will be needed before the end of the century.

Radionavigation.—The U.S. objective of providing two bands (1215 to 1240 MHz and 1559 to 1610 MHz) for space-to-Earth navigation signals to accommodate the NAVSTAR/GPS was achieved. NAVSTAR/GPS is the cornerstone of future DOD high accuracy global navigation. It can also provide for improved civil navigation.

Satellite Communications.—The U.S. objective to maintain the status quo for MSS in the 235- to 399.9-MHz band used by the Naval Fleet Satellite Communication System (FLTSATCOM) was partially achieved; however, coordination provisions (article N13A) were added that included a condition that stations in MSS not cause harmful interference to those of other services operating, or planned to be operated, in accordance with the table of allocations. To forestall the potential negative impact, the United States and most of its NATO allies, took a reservation in the Final Protocol.

A major U.S. objective was achieved through the recognition of MSS. The bands 7250 to 7750 MHz and 7900 to 8400 MHz had been allocated to FSS (DSCS I, II, III, NATO SATCOM). Now, the MSS can operate on a primary basis in the bands 7250 to 7375 MHz and 7900 to 8025 MHz; however, there was a corollary loss of the partial exclusivity for FSS in two 50-MHz bands (7250 to 7300 MHz and 7975 to 8025 MHz). There was a net gain for national security objectives through these changes, although deployment of satellite systems without causing interference to radio relay systems in some areas will become increasingly difficult.

All U.S. objectives were met in the 20-, 30-, and 40-GHz bands that may be used by future generation military satellite systems (e.g., DSCSs), including provisions for accommodating MSS.

The United States sought to avoid the possible future loss of system design flexibility and orbit locations associated with a rigid a priori allocation plan for satellites in the geostationary orbit. While no plan was adopted at WARC-79, plans were made for a future conference on space systems to be held no later than 1985—with a follow-on conference about 18 months later. These space conferences will probably result in some form of orbit spectrum planning that could inhibit technological development. The impact on all future DOD space systems is potentially very large. Proper preparation for these conferences is essential, including adequate budget allocations.

High Frequency.—The U.S. objectives of providing for the increasing requirements of international broadcasting (e.g., Radio Free Europe, Voice of America, etc.) and maritime operations (while limiting the loss of HF spectrum for DOD operations) were met, although the United States took reservations below 10 MHz for both of these services. The net reduction of only 14 percent in HF spectrum available to DOD should not adversely affect U.S. strategic networks, which rely increasingly on satellites, and the available spectrum should accommodate our tactical and other HF national security requirements.

Fixed and Mobile (Terrestrial).—The U.S. objective of maintaining the status quo in the important NATO band of 4400 to 4990 MHz was not met. The band is heavily used by the military for tactical communications (primarily radio relay and troposcatter systems). Although the present and past allocations provided for FSS in this band, there is no known satellite system operating as such.

In order to provide some protection, the fixed-satellite was changed from uplink to downlink and shifted from 4400 to 4700 MHz to 4500 to 4800 MHz, which is shared with fixed and mobile. (The aeronautical-mobile service is excluded from 4825 to 4836 MHz and 4950 to 4990 MHz by footnote.) The band 14.5 to 15.35 MHz was also designated by NATO as a primary military band for fixed and mobile services. WARC-79 included the FSS (Earth-to-space) in the band 14.5 to 14.8 MHz shared equally with fixed and mobile. By footnote, FSS would be limited to the broadcast feeder links and would be reserved for countries outside Europe. The effect is that, if satellite service is instituted, the military systems would have to be located and operated in a manner that would not cause interference. Analyses of potential interference might lead to the requirement for sharing sensitive military technical data with civil administrations. The impact of these changes cannot be fully determined until after discussions with our NATO allies.

Intelligence.—The impact of WARC-79 on U.S. intelligence systems is not discussed in this report.

Resolutions, Recommendations, Reservations, and Declaration

Many of the important consequences of WARC-79 derived from resolutions and recommendations approved by the conference and from reservations and declarations by individual countries indicating a refusal to be bound by a particular decision of the conference or agreeing to undertake certain actions in order to conform to a decision.

A total of 87 resolutions and 90 recommendations were adopted by WARC-79. Many of the resolutions referred certain topics for study by CCIR or proposed the convening of world or regional administrative radio conferences. In addition, the developing countries introduced several resolutions seeking increased assistance in the following areas:

- technical cooperation in maritime telecommunications, especially by providing technical advice and by assisting in training personnel;
- technical cooperation in national radio propagation studies in tropical areas designed to improve and develop the developing countries' radiocommunications;
- development of national radio frequency management within the developing countries through such means as regional seminars and training;
- transfer of technology in telecommunications for the purpose of developing services and attaining social, economic, and cultural objectives of the developing countries; and
- use or role of telecommunications in rural development. .

Those resolutions look to UNDP as the primary source of funding. However, the United States will be expected to participate directly or indirectly in the areas described. Some decisions must be made how the United States should respond to requests for assistance.

Many of the resolutions and recommendations relating to the CCIR study topics have to do with such highly controversial subjects as the use of the geostationary satellite orbit and the planning of space services utilizing it; the convening of a WARC for the planning of the HF bands allocated to the broadcasting service; and, the convening of a regional administrative radio conference for this detailed planning of the broadcasting-satellite service in the 12-GHz band and associated feeder links in region 2.

About 2 dozen specialized world or regional administrative radio conferences were proposed at WARC-79, many of which can affect U.S. interests. The conference recommended that three world conferences and seven regional conferences be held. (The recommended conferences and their projected dates are listed at the end of chapter 6.)

A reservation, as noted earlier, is a formal statement, as part of a protocol, wherein an ITU member indicates that it will not abide by a particular decision of a conference. These reservations are called protocol statements in the Final Acts of WARC-79 and this time the United States took a total of six. (Reservations generally provide a means by which countries can accept the majority of decisions reached by a WARC without being bound by a particular decision.)

Two of the six were rebuttal statements in which: 1) the United States rejected a Cuban complaint that U.S. use of radiofrequencies at our Guantanamo Naval Base was an impediment to Cuba's communication services and Cuban sovereignty; and 2) the United States joined with 22 other countries in noting that the claims of equatorial countries to sovereignty over segments of the geostationary orbit were not germane to the work of the conference. Such rebuttal statements are common in conferences such as WARC-79 to indicate that political rhetoric should not be confused with international agreements.

A third U.S. reservation called attention to the fact that our international broadcasting in the HF bands was being intentionally jammed by other ITU members and reserved the right to take "necessary and appropriate action" to protect U.S. broadcasting interest. The statement was included primarily to put the jamming problem on the record inasmuch as the subject was not mentioned during the course of the conference, although Israel made a reference to jamming in its statement for the final protocol.

None of these three reservations will impact on telecommunications operations directly; however, all three are likely to resurface at future conferences.

The remaining three U.S. reservations dealt directly with spectrum matters. In Protocol No. 32, the United States participated in a joint NATO statement rejecting the terms of a footnote affecting the operation of MSS in the bands 235 to 322 MHz and 335.4 to 399.9 MHz. The NATO countries agreed that they could meet the prescribed coordination procedures called for in the footnote. However, they rejected an additional provision of this footnote imposing a condition of noninterference. The concern was that this condition could lead to a request to cease operation of a previously coordinated satellite system when another country merely planned a system that might receive harmful interference from a MSS operating in the band. A separate reservation of Canada supported the U.S. view that future or planned terrestrial systems should not jeopardize existing MSS.

In Protocol No. 36, the United States joined the seven other countries in protesting the inadequate provision for HF broadcasting—particularly at 6 and 7 MHz. Fourteen other countries individually took reservations on this same matter. They all expressed concern that the forthcoming HF broadcasting conferences (1984 and 1986) will be hampered by the lack of adequate allocations, and reserved the right to take the necessary steps to meet the needs of their HF broadcasting services.

The United States took a major reservation in Protocol No. 38 that was submitted in five parts. The first two parts referred to Protocol Nos. 36 and 32. The third part stated that the United States could not guarantee protection to or coordination with other services that experienced interference from radars operated on a primary basis in a variety of specified bands. The fourth part stated that the United States reserves the right to operate fixed, mobile, and radiolocation services in the bands 470 to 806 MHz and 890 to 960 MHz without the required coordination procedures specified in footnotes pertaining to these bands. The United States agreed to coordinate its usage of such services with neighboring countries that are affected, but not with all the other countries that might, for no apparent good reason, request coordination under article 14.

Part five of the reservation addresses the failure of the conference to provide adequate allocations for the maritime-mobile service below 12 MHz. In this reservation, the United States indicated that allocations to the mobile service below 10 MHz would be used to satisfy maritime mobile requirements.

The U.S. reservations contained in Protocol Statement 38 represent a conscious decision to take whatever steps are necessary to protect vital U.S. national interests. They cannot be regarded simply as a failure by the U.S. delegation to get what it wanted at WARC-79. This is no more valid than listing the hundreds of U.S. proposals that won approval and thereby claiming overall success.

Foreign Reservations

The remaining 77 reservations, some of which bear the names of several countries, can be grouped in three categories:

- general reservations;
- political reservations; and
- specific reservations.

Some 35 reservations can be categorized as "general" in that they were merely statements of a country's intent to do whatever is necessary to protect its radio-communication services should other ITU members fail to observe the radio regulations or take other detrimental measures.

Another 17 reservations are "political" in that they relate to territorial disputes (United States and Cuba over Guantanamo; Great Britain and Argentina over the Falkland Islands; Chile and Great Britain over the Antarctic), two others relate to sovereignty claims to the geostationary orbit.

Finally, 28 reservations address specific issues. Of these, 19 are concerned with the allocation of HF among the broadcasting, fixed, and mobile services. The majority of these were entered by developing countries and state that they may not be able to satisfy their fixed and mobile service requirements with the reduced allocations and they reserve the right to continue using these frequencies for those services. The large number of reservations on this single subject shows that the issue of HF allocations is far from settled. Continuing difficulties are likely, including actual interference with existing services, the inability of some countries to satisfy their requirements, and a troublesome time at future scheduled broadcasting conferences.

This leaves nine specific foreign reservations on all other subjects. Of these nine, four deal with the UHF band. All are related to localized problems, none of which greatly affect the United States. The remaining five are as follows:

- Belgium warned that it will use the band 100 to 104 MHz for a new network of broadcasting stations. Since the band is now, and has been, allocated for this service, the reservation addresses the question of allotments or assignments in a region 1 broadcasting plan, a subject outside the agenda of WARC-79.
- Japan said in another statement that it will continue to use the band 130 to 526.5 kHz for aeronautical radio-beacons. If region 1 broadcast stations continue to cause interference in the band 190 to 285 kHz, Japan will reallocate to protect itself.
- Nigeria claimed that the allocation of 14 to 14.8 GHz for feeder links to broadcasting satellites is not acceptable. This reservation is apparently intended to indicate that 14.0 to 14.5 GHz will be used for INTELSAT satellite services in Nigeria leaving only 300 MHz for feeder links to broadcasting satellites. However, sharing arrangements between those services should help assure adequate spectrum for feeder links.
- In a joint reservation, France and Switzerland objected to high-power broadcast stations below 5000 kHz and above 41 MHz. Brazil expressed opposition to a WARC resolution establishing the period of validity of frequency assignments to satellites prior to the 1985 and 1987 space planning conferences, arguing that the resolutio would prevent

the planning conferences from deciding on other distributions of frequency and orbit allotments. However, the resolution specifically stated that its application should not prejudge decisions of the planning conferences.

- Finally, a Thailand reservation extended its allocation to the mobile service (except aeronautical-mobile) to the entire band 430 to 440 MHz. The effect is minimal because of the many other services and countries already included by footnotes.

Declaration

The United States signed a formal declaration of intent together with other countries at the WARC-79 conference as part of the effort to resolve the controversy surrounding use of the band 3.4 to 3.7 GHz.

In ITU regions 2 and 3 (the Americas, Oceania, and Asia) this band is allocated on an equal basis to both the fixed satellite and radiolocation services. Based on studies showing that it is not feasible for these two services to share the same band, the United States has not implemented FSS, but has carried on important military radar operations in this band. Commercial satellite systems—both the global INTELSAT system and U.S. domestic systems—operate in the adjacent band 3.7 to 4.2 GHz. The U.S. proposal to the WARC-79 was to maintain the status quo and retain radiolocation as a primary service in the 3.4 to 3.7 GHz band. While the United States was prepared to make some provision for FSS to use a part of the band, other countries, particularly from the developing world, insisted that the entire band be made available to expand satellite service.

From the viewpont of the satellite operator, this proposal represents a logical and cost effective expansion into a band contiguous with existing operations. The problem for the United States, of course, is that it has large investments in radar equipment that is vital to national security and these radars would interfere with satellite operations in the same band.

Negotiations were intense and a compromise was found late in the conference. The final result did, indeed, reduce radiolocation to a secondary service in the International Table of Allocations. However, by a footnote to the table of allocations, primary status was restored to the radiolocation service in regions 2 and 3 for the bands 3.4 to 3.6 GHz. The footnote includes a directive for ITU members to take all practical steps to protect FSS after 1985 with a nonbinding appeal for radiolocation systems to cease operations by 1985. The compromise was made possible by the removal of any mandatory requirement to cease radar operations in the band. As part of the compromise, a declaration was signed by the United States, Canada, the United Kingdom, the Netherlands, Australia, and Belgium vowing to make reasonable effort to accommodate FSS in the band.

The United States will determine how to implement the intent of the declaration through its domestic processes. There are no FSS Earth stations currently operating in the 3.4- to 3.7-GHz band. However, the United States agreed not to withhold support if INTELSAT decided to undertake FSS operations in that band. If such a decision was made, the United States would be under strong pressure to restrain radar operations that might interfere with international satellite operations.

In the FCC's third notice of inquiry concerning implementation of the Final Acts of WARC-79 (General Docket 80-739) FCC proposed that only limited use be made of the FSS allocations in the 3.6- to 3.7-GHz and 4.5- to 4.8-GHz bands. The FCC's notice proposes a limitation on the use of these bands to international satellite systems (specifically the INTELSAT global system) and excludes domestic satellite systems. FCC expects, according to its third notice of inquiry, that no more than one Earth station on each coast of the United States can be successfully coordinated with stations operating in the radiolocation service.

The Impacts of WARC-77

The 1977 World Administrative Radio Conference for broadcasting satellites was convened to plan the use of the 11.7- to 12.2-GHz band that had been allocated in 1971 on a primary basis to the broadcasting satellite service, the fixed service, broadcasting service, and (in region 2 only) FSS. The decisions reached at WARC-77 are superseded by the Final Acts of WARC-79, but the manner in which these decisions were reached, and their longer term consequences, deserve some discussion.

Because the broadcasting satellite service was in an early stage of development, the United States produced elaborate technical arguments in advance against the adoption of a detailed geostationary orbit and channel allotment plan, believing that such a plan would waste orbit and spectrum and hinder technological advances. The United States proposed instead that the conference approve certain actions that would encourage planning that was evolutionary and flexible, rather than detailed and restrictive, and would make adequate provision for FSS in region 2 (the Americas).

The conference ignored the U.S. technical arguments and embraced the concept of detailed planning for two basic reasons:

- the majority of developing countries wanted to be assured of guaranteed access to specific orbital slots and channels and were convinced that a detailed a priori plan offered them that assurance; and
- a number of European countries believed that the adoption of an a priori plan would permit them to proceed with development of terrestrial services in the 11.7- to 12.2-GHz band.

Neither of these two goals would have been helped by adoption of an evolutionary plan that was subject to change. Moreover, the United States, Canada, and Brazil were the only countries planning use of the band for FSS and therefore concerned with problems of sharing between broadcasting satellites and FSS. Also, the United States and Canada had unilaterally ruled out primary domestic use of the band for terrestrial services.

The U.S. delegation made extensive efforts to find fallback positions, or supporting technical documentation, which, while encompassing U.S. views, would meet the concerns of other countries. These efforts were unsuccessful. The United States failed to forestall the adoption of a detailed plan for regions 1 and 3, but succeeded in putting off detailed planning for BSS in region 2 until 1983.

It can be argued that the United States prepared for the wrong conference in 1977. The delegation was thoroughly armed with technical arguments based on experimental operation of ATS-6 and CTS satellites with broadcasting capabilities. The United States sent representatives to a series of regional ITU seminars and held bilateral discussions with a number of countries, including West Germany, Japan, the U.S.S.R., and the United Kingdom. Reports from these meetings made it clear that the U.S. position was shared by very few countries and was more than likely doomed to failure from the start.

Thus, in spite of a major U.S. effort, the principle of a "negotiated plan" for the space services was established and fully accepted by a large majority of ITU members at WARC-77, and the "planning" adopted was detailed planning including specifications of national orbital positions, channel assignments, service areas, and a variety of detailed technical characteristics. There is no reason to assume that this approach will not be advocated for other space services, such as FSS, in future conferences.

A major challenge for the United States will be to develop alternate planning approaches that will satisfy renewed demands for "guaranteed access" for all countries and still permit the introduction of advanced technology to increase the capacity of the geostationary orbit and related spectrum to meet increasing requirements.

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Chapter 5

Alternative Structures, Procedures, and Strategies

Introduction

Countries planning for the extension and growth of their telecommunications networks and improvements in communications generally have to set out a reasonably long-term strategy since a number of very important factors (resources, investments, sociopolitical needs and trends, international relations, technological possibilities and threats) must be considered concurrently.

Communications and information systems technology has reached the stage where concepts such as the "information-based society" are the subject of intense national and international discussion. High technology systems of advanced computer-communications including digital/switched facsimile, computer polling systems, packet switching data networks, distributed processor-controlled switching, and multiple-access satellite systems are appropriate to the needs of both developed and less developed countries. The use of such technology can greatly reduce costs for important services; they can extend service to rural or remote points; they can give these countries fast and convenient access to the best and most advanced information banks in the world. Many nations are beginning to grasp these implications. As a result, telecommunications is increasingly viewed as a "tool for development" and as a key to greater information capacity and power. This suggests that national communication and telecommunication planning must take account of broader considerations than were once considered necessary.

The telecommunication planner faces a new and potentially explosive situation. The facilities and services now being considered create a new infrastructure—an electronic infrastructure that makes possible and promotes electronic information transfer that will have significant, often radical, effects on the structures of cities, transportation, economics, education, banking, postal services, the nature and control of information media, the privacy and security of citizens, as well as general lifestyles. Changing political, sociological, and economic needs or constraints will, in turn, strongly influence the range, tariffs, and structure of the telecommunications facilities and services. The future environment is considerably more uncertain than the present volatile scene. It is also more political and characterized by a growth in the "communications consciousness" of people.

There is growing recognition that electronic and telecommunication technologies and their application to new integrated systems are an important source of economic stimulus. The importance of these technologies in social and economic development, national security, cultural diffusion, and influence over popular thinking combine to create a strong bias and argument for promoting and protecting national information industries and U.S. electronics manufacturing capability.

Information power is being increasingly recognized and used by the nations of the world to increase and enhance their economic and political power. Telecommunications is a key resource in the creation and exploitation of information capacity and power. As nations realize and appreciate the pivotal role and importance of information and information power, telecommunication policies will be viewed as strategic means for increasing national sovereignties and reordering world affairs.

A More Restrictive Global Information Environment

Information exchange between and among nations is essential if nations of the world are to function as viable societies in a multipolar, information interdependent world. The global flow of information is essential to the sustenance of the current level and pattern of the world's collective intelligence and economic production, development, and growth. The underlying principles of freedom of information and freedom of expression have given rise, in some countries, to the doctrine of free flow of information. For 30 years, the idea, given legitimacy at the United Nations, was that no barriers should prevent or distort the flow of information among nations. This doctrine is presently under serious attack.

The absence of, or loss of confidence in freedom of information rights or privileges in many of the Third World nations, as well as the Communist countries, is a fundamental threat to the global flow of information. In conjunction with the indirect barriers imposed by other international information issues and concerns, namely transborder data flow, the potential regulation of information imports and exports (contained in national policies for patents, advertising technology transfers, direct investment, appropriate technology, etc.), the protection of domestic electronics and information industries, and the global patterns of information power, the future suggests a much more restrictive global information environment.

On the way to this new global information infrastructure, the United States and other nations will face a broad range of major problems and issues including:

- international technical operating standards and procedures;
- privacy and other considerations affecting transborder data flows;
- international marketing rules;
- reconciliation of national differences concerning service availability and accessibility, information availability and accessibility, sociocultural variations, frequency assignments and management, national telecommunications and information policies;
- impacts on national sovereignty;
- influence and control of information on world events, attitudes, and outcomes; and
- the benefits of information imports v. the cost of information dependency.

Many of the developing countries are already evidencing an awareness of the linkages among these issues and of the interplay and interdependency that exists with radio spectrum matters.

Renewed Focus on Regional Telecommunications

The 20 years ranging from about the mid-1950's to the mid-1970's can be considered the global expansion phase in the development of international telecommunications. This was dominated by the initial laying of undersea telephone cables and the establishment of international satellite communication facilities and institutions (e.g., INTELSAT). The thrust was towards intercontinental connections and national access to the global satellite network. Dramatic decreases in international satellite communication costs and a corresponding increase in demand reflected and characterized this global expansion period.

We are presently in a phase in which regional needs and policies will predominate. Nations will become more interested in specific connectivity of external communication routes in support of national and regional political and economic goals and information policies as contrasted with the more general nature of global facilities expansion. The thrust will be on intraregional communications along with focused development or enhancement of specific interregional communication routes.

Corresponding to this shift in needs and opportunities will be a change in institutional influence. Regional bodies such as the European Conference of Postal and Telecommunications Administration (CEPT), the Arab satellite consortium (ARABSAT), and entities that support regional policies of political and economic integration (such as the Association of Southeast Asian Nations (ASEAN) will grow in influence relative to such bodies as the International Telecommunication Union (ITU), which will be compelled to accommodate these pressures and make strategic changes.

A More Active and Stronger Government Presence

Without doubt, governments around the world will become increasingly involved in the development, management, and control of communications technologies, products, and applications. They will seek to utilize and manipulate telecommunications, including frequency matters, in furtherance of national and international goals.

In most of the world, telecommunication services are provided by a state-sanctioned monopoly, that whether state owned or not, is likely to be a government or quasi-government institution. This is not the case in the United States and it is a factor that assumes added importance as computer and communications services continue to converge, eroding the boundaries between the private and public sector in communication and information goods and services.

U.S. Government Communications Policy and Structures

How is the United States likely to fare in this new environment? While it can be argued that the present structure of the U.S. Government and its policymaking processes in the telecommunication areas have protected and sustained our vital national interests to date, the question is whether it will be adequate for tomorrow. Since spectrum is the common denominator in all uses of radio, coordination is essential for the various services to function in a compatible manner. It is this coordination, which has over the years become a very specialized and sophisticated art, that frequently bears directly on policy decisions. Much of the ITU-sponsored negotiations relate to spectrum use. Because of this, spectrum management in the United States has been scrutinized many times, sometimes criticized, and sometimes praised, down through the years.

Starting at least 30 years ago there has been concern over the effectiveness of the government structure to cope with the international aspects of telecommunications—particularly the negotiation of agreements within ITU and other United Nations (U.N.) organizations. Most of the international negotiations have been motivated by technical considerations, primarily radio spectrum issues, without the advantage of a clearly stated overall national telecommunication policy.

The United States has done well in most of these negotiations but with each international conference the maneuvering room has decreased and thus the preparation and actual negotiating have become more difficult.

As we go into the decade of the 1980's, the international aspects of telecommunications are becoming more preeminent than ever. No longer can fundamental telecommunication policy issues be avoided by relying on technical agreements, motivated by technical considerations, and negotiated on the presumption that only technical issues need resolution. Unfortunately, the present Federal Government structure, while responding to the technical aspects of international communications negotiations, has not developed a mechanism or procedure for developing comprehensive policy.

There are three fundamental weaknesses in the present structure:

1. The lack of appreciation at the top decision levels of the Federal Government and industry as to the vital role of telecommunications in the international and domestic political, economic, and private affairs of the United States, and the need for policy coordination.
2. There is a lack of centralized policy coordination and guidance for international telecommunication negotiations at a high enough level in the Federal Government to be effective.
3. The State Department's Office of International Communications Policy is neither staffed nor institutionally organized to carry out effectively all of the functions involved in international telecommunications negotiations.

These structural weaknesses are a direct reflection of the lack of clear U.S. policy for telecommunication matters including spectrum management issues. Moreover, the U.S. permanent spectrum management mechanisms are not adequate to review all stated requirements of Government and nongovernment spectrum users objectively or to verify and adjust needs consistent with national policy objectives. The United States also lacks an effective means of collecting data and developing guidelines to judge the merits of one spectrum use over any other.

U.S. Structure and Processes for Spectrum Management

The planning and management of the spectrum in the United States is handled by the Federal Communications Commission (FCC) (as manager for nongovernment users) and by the National Telecommunications and Information Administration (NTIA) (as manager for Federal Government agencies requiring spectrum for their radio-communication systems). Each executive branch agency develops its requirements for spectrum and orbit use and these are discussed and coordinated through the mechanisms of the Interdepartment Radio Advisory Committee (IRAC) and its several subcommittees. The nongovernment requirements of commercial public and private users are developed through the FCC notice of inquiry (NOI) process often with the aid of advisory committees. NTIA and FCC coordinate to resolve differences and together with the State Department develop a single set of U.S. proposals for ITU administrative radio conferences such as WARC-79.

NTIA and FCC must agree on the bands that are proposed for individual services and this requires agreement on the eventual domestic allocation of each band: whether for Government use, nongovernment use, or shared use. The State Department serves as ombudsman in resolving disagreements, if any, over U.S. proposals to international radio conferences and the President acts as final artiber if the State Department cannot resolve the problem. Depending on the portion of the spectrum involved, shared use ranges from about 20 percent for the region between 100 and 1000 MHz to 100 percent for the band 10 to 100 kHz. The working level forum for the generation of Government proposals and coordination between them and the nongovernment proposals is usually a special ad hoc committee of IRAC. Such ad hoc committees include participation by FCC liaison representatives who present the nongovernment view.

Consensus between NTIA and FCC on the division of spectrum between Government and nongovernment users does not necessarily ensure the most efficient use of spectrum. Moreover, IRAC is an advisory committee to NTIA and it can recommend but cannot compel spectrum-efficient design or technology on large, powerful agencies like the Department of Defense (DOD). The power and resources of NTIA to successfully challenge spectrum decisions of such agencies are limited.

Possible Procedural and Structural Improvements

Procedural Improvements

Improvements needed in the present procedures for managing and planning Government and nongovernment use of the spectrum include better means to provide adequately for:

- validation of requirements, giving particular attention to current spectrum usage, technology and development trends, and sharing opportunities between competing users of the spectrum;
- inclusion of spectrum and orbit efficient techniques and technology in system design of both Government and nongovernment systems;
- apportionment of frequency spectrum between Government and nongovernment services based on national priorities;
- effective planning for future spectrum and orbit needs;
- efficient and timely preparation for and participation in ITU conferences; and
- effective management of existing services and users on a continuing basis.

Some of these shortcomings could be corrected without any fundamental change in the structure of FCC or NTIA. Assigning spectrum management a higher priority and using resources more efficiently would help improve the present situation. For example, FCC should be able to improve its data base for spectrum management with the help of its own computer and spectrum experts. The establishment of deadlines for inclusion of licensing information in FCC master files can be accomplished by FCC action. A more fundamental procedural change would be to place all incoming applications for licenses, construction permits, authorizations, etc., in FCC computer on receipt. In other words, FCC could institute an information and data processing system approach to aid its spectrum management activities.

The validation of spectrum requirements, and the apportioning of spectrum between Government and nongovernment users, should receive closer scrutiny. A mechanism using analytical tools to evaluate needs and assess priorities among competing users of the spectrum would provide decisionmakers with basic information and data for use in establishing policies and reviewing requirements. Federal spectrum requirements are reviewed by IRAC and its Spectrum Planning Subcommittee, but this function needs to be strengthened and broadened to effectively consider longer range impacts. FCC needs to be better equipped to assess future spectrum requirements of the private sector, including the use of new technology.

Economic techniques (e.g., auctions, lotteries, spectrum fees, resale of frequency spectrum assignments, etc.) should be considered, at least on an experimental basis, to provide guidance on the consequences of different spectrum allocation decisions and the introduction of newer technology. These should include techniques for evaluating the relative economic viability of alternative spectrum uses, as well as radio v. nonradio communication systems. The use of economic techniques in spectrum management might require legislative action. FCC, perhaps with the aid of a task force, other Government agencies that have studied the question, industry groups, and private experts, could select a few services for detailed analysis of the prospects of using one or more economic techniques. FCC could then present its recommendations for the experimental application of a selected technique, or techniques, to one or a limited number of services and frequency bands to Congress for its information and action, if necessary.

Problems relating to forming a U.S. delegation for WARC-79 could be addressed and the effectiveness of U.S. participation in international meetings could be improved by several steps: 1) industry and other nongovernment delegates could again be permitted to participate fully as U.S. representatives at international telecommunication conferences and take any assignments on the delegation for which their skills and experience qualify them. Legislation to accomplish this passed both Houses of the 96th Congress. However, the legislation to which it was added was vetoed by the President for reasons unrelated to the exemption. The measure was again passed by the Senate and reported by the responsible House committee, but the House of Representatives did not consider it before adjournment; 2) consideration could be given to finding means to comply with due process requirements under the Administrative Procedures Act and still name industry and other nongovernment representatives to delegations on a timely basis; and 3) establish guidelines with an implementing mechanism to name the chairman and individual delegates to the U.S. delegation. Qualifications required, distribution of various skills needed, and type of representation desired would be selected from the best candidates available, especially those who participated in the preparatory effort. If special Government support is necessary to assure certain representation, then that support should be available early in the preparatory stages.

Structural Improvements

Chapter 3 discussed the present structure within the Federal Government to perform spectrum management and participate in international telecommunication conferences. Consistent with the findings of past commissions and task forces going back to 1950, this study also finds that structural improvements are necessary. Primarily, the problems stem from the absence of high-level Government attention to effective policy coordination. Accountability for spectrum management issues and international negotiations is difficult to assign under the present structure.

Congress could consider ways to improve the present structure or examine possible changes in the structure. A detailed analysis of alternatives is beyond the scope of this study that concentrates on the results of

WARC-79. However, at least four options are available to Congress:

1. maintain the status quo and make no changes;
2. maintain the present structure, but raise the level of attention and accountability within the responsible agencies;
3. establish a mechanism—such as a task force of high-level Government officials—to develop, examine, and make recommendations on structural and procedural improvements; or
4. establish a permanent board, council, or interagency committee of high-level Government officials to be responsible and accountable for international telecommunication policy coordination and the preparations for international conferences.

Option 1: Status Quo.

The relatively low priority given to spectrum management issues within the Government will likely continue under the status quo as discussed in this report. This reflects the relative lack of appreciation and attention at a high level of Government to telecommunications generally. Even with the unprecedented number of upcoming conferences of ITU and the direct importance of these conference decisions to the United States, the State Department, particularly, will find it difficult to raise the priority of radio spectrum issues vis-a-vis other nontelecommunication foreign policy issues. Moreover, FCC is unlikely to assign a higher priority to spectrum management in light of other pressing regulatory policy issues.

Option 2: Raise the Level of Attention Within the Present Structure.

Congress could take steps through its oversight activities to focus attention on ways to improve coordination and develop coherent policies and strategies for international telecommunication matters generally and spectrum issues in particular. Congress could require special reports from responsible agencies on steps taken to improve the status quo spectrum management throughout the Government. Several possible procedural measures were discussed earlier. In addition to those, it may be beneficial to establish a more formal and continuing conference preparatory mechanism within the existing structure of divided responsibilities among several Government agencies. This would replace the more "ad hoc" approach followed in the past. If such a mechanism was not justified when ITU conferences were held at infrequent intervals, it appears necessary now when over a dozen conferences are scheduled over the next 7 or 8 years. Complex issues of vital concern to the U.S. with direct consequences for both international and domestic telecommunications are on the agendas of these meetings. Developing and recommending skilled delegates for U.S. delegations could be made a part of this process. Formal training in negotiating, language, and diplomatic skills could also be included.

Option 3: Create a Task Force To Examine and Make Recommendations on Structural Changes.

Congress could mandate that an interagency task force of high-level officials from responsible Government agencies be established. This task force would examine alternative structural changes, assess the pros and cons of each, and report to the President with recommendations. The President, in turn, could make a report to Congress with specific proposals where legislation is required. Because of the divided responsibilities and direct influences of several Government agencies, the task force might include representatives from the following agencies: Department of Commerce—including NTIA, Department of State, FCC, DOD, Department of Justice, Office of Management and Budget, and possible representation from the Office of the U.S. Trade Representative.

Option 4: Establish a Permanent Board or Other Mechanism.

Congress could consider the establishment of a permanent board, council, or interagency committee to coordinate international telecommunication policy. Spectrum management issues and international negotiations would be key elements of the work of this body. Such a board could be charged with the continuing responsibility to: coordinate international telecommunication policy; plan and direct strategies to achieve policy objectives; assess the need for personnel and other resources within the Government to conduct an effective international program including ways to use resources more effectively; and prepare for international conferences and meetings.

Depending on the specific mandate for such a board, the present structure for spectrum management within the Government would be altered to a greater or lesser extent. For example, the present structure could be left intact with the board providing the centralized point of coordination. However, the board could be made accountable for seeing that policies and actions are coordinated and that a coherent and effective program for U.S. international telecommunication matters is maintained. As a part of its functions, the board would assure that the necessary linkages are made among the various elements within Government agencies, between agencies, between Government and industry, and among the international forums concerned with telecommunication matters.

Bills have been introduced in the Senate and House recently to establish a mechanism aimed at improving the U.S. posture for international telecommunication matters. Also, in recent years, other legislation has been introduced that would alter the present Government structure for telecommunication matters. These and other approaches could be considered under options 2 and 3 above.

U.S. Strategies for Dealing With International Spectrum Issues and ITU

The United States may have reached a crossroads in its relationship with ITU. Having started in 1865 as a relatively noncontroversial organization of 20 nations concerned mainly with the interconnection of their telegraph systems, ITU has evolved into a contentious assembly of 155 nations that look to the Union to solve fundamental issues of allocation and regulation of radio spectrum resources.

The ITU structure, which was well suited to the analysis of interference between radio communications systems, and to achieving a consensus on noncontroversial matters among a small number of broader issues, is sorely tested by the demands of numerous countries exhibiting the widest possible range of technical, economic, cultural, and political backgrounds. Many of these issues did not originate at ITU, but have ended up there, often argued by delegates unschooled in the technical language that has been the sine qua non of ITU. Thus, the mechanism that brought together highly trained engineers to consider abstruse issues of interference between sophisticated communications systems is becoming a focal point for broader policy issues with political posturings by delegates to further national and political objectives. ITU structure, procedures, and mechanisms have not changed, but the problems have changed enormously. The ITU must now develop greater flexibility if it is to function effectively in a new and dynamic environment.

The radio spectrum is essential to the communications infrastructure of the United States, and it is not an easy matter for the United States to concede its vital national interests to satisfy the demands of many nations that repeatedly assert their "equal right" to the radio spectrum even though they have no immediate need or capability to use additional allotments for the foreseeable future. U.S. officials must ask themselves whether this nation can continue to accept these same structures, procedures, and mechanisms in an important, essentially allocative forum as are routinely tolerated in other situations that are more abstract or political in nature, and less concerned with vital U.S. interests. Will U.S. negotiating skills and technological proficiency enable us to achieve our essential goals and objectives in a forum that employs a "one-nation, one-vote" decisionmaking formula and in which the United States and the other developed countries are greatly outnumbered by the less developed member countries?

The answer is not readily apparent. What is apparent is that our technically oriented approach that has served so well in negotiating the technical issues of the past two or three decades, is simply not sufficient for the broader issues of today. The United States must make some policy decisions, reflecting changes in U.S. strategy or in the structure or procedures of ITU, and then augment the scope and training of the responsible U.S. personnel consistent with those decisions.

The United States has essentially two alternatives: it can seek various improvements in the present means for solving spectrum allocation problems within ITU as it is now constituted, or it can seek to alter the existing structure, procedures, or mechanisms of ITU itself. The policy options considered here may be divided into two broad categories, strategic and structural.

From the strategic standpoint, assuming no significant changes in ITU, the United States has a wide range of options. At one extreme, the United States may conclude that the drawbacks of continued participation in ITU outweigh the benefits, and withdraw from the organization or decline to participate in its deliberations. At the other extreme, the United States could decide to yield to other nations on controversial matters and play a passive role within ITU. Between these extremes there are a number of alternatives. One that requires no structural or procedural changes in ITU would be a serious attempt at better coordination of our views and objectives with other nations in advance of ITU meetings, and better U.S. planning based on improved understanding of other nations' views.

Another strategic option that might help to achieve U.S. objectives even if ITU remained essentially unchanged would be for the United States to seek to remove controversial issues from the ITU forum and attempt to solve them in other ways. A current example would be to respond to the demands of developing countries for "guaranteed access" to radio spectrum and satellite locations by developing the institutional arrangements to ensure domestic communication services to these nations. This could be a common-user system either building upon the present INTELSAT structure or creating a separate system for domestic services. Such a solution would offer each nation all of the satellite services or capability it could realistically use, without allocating to small nations significant amounts of satellite spectrum and orbit locations that might then remain unused for the foreseeable future.

From the structural standpoint, assuming that ITU can be changed, a number of options are available. One relatively extreme example would be to seek revision in the voting formula of ITU to one that was more advantageous to the United States, perhaps by giving added voting weight to those countries that contribute most heavily to the U.N. budget. A more modest option would be to increase the number of ITU regions beyond the present three so that regional issues could be dealt with by a smaller number of countries most directly concerned.

Policy Option No. 1: Withdrawal From ITU

Would withdrawing from ITU guarantee the United States unhindered use of the spectrum allocation or frequency assignments we need? Probably not. Member nations of ITU rely on the organization to avoid interference from the radio signals of others and to achieve interoperability of certain mutually used systems. Avoidance of interference is the essence of spectrum allocation or frequency assignment processes. The assignment of a particular frequency is of little value if others feel free to use it for purposes that cause interference. There are no effective sanctions to force compliance with ITU decisions. Therefore, the United States, as do all nations, relies on the voluntary agreement and cooperation of other nations to refrain from interfering with its use of the spectrum.

Abrupt withdrawal from an ITU in which the United States was unable to have its own way could well intensify the risk of interference. For applications that are vulnerable to interference, it seems clear that preemption of spectrum would be ineffective. Any nation that chose to interfere, whether due to a valid need for the particular frequency band or by intentional jamming, could greatly reduce the value to the United States of the preempted spectrum.

There are some important spectrum uses that are relatively invulnerable to interference (e.g., high-power radar systems with electronic countermeasures capability), but any preemption of spectrum by the United States would likely result in retaliation by other nations in areas where it was vulnerable. There might also be spill-over into nonspectrum relationships with other nations, such as transborder data flow or telecommunication equipment trade matters. Extreme forms of retaliation, such as refusal to interconnect telephone or telex systems with the United States, would be unlikely since these services are probably as much in the interest of many other nations as in our own.

What would happen to the generally friendly process of coordination to avoid harmful interference? The bulk of our coordination takes place with the developed countries that are fewer in number and with whom the United States has fewer fundamental differences than with the Third World nations that have recently begun challenging and, in some cases, outvoting the United States. It is conceivable that the United States could abandon ITU and establish a more congenial grouping of developed countries as a forum for coordination to avoid interference, and simply ignore other countries. Coordination and information exchange would become less certain by the omission of the majority of nations, even if their spectrum use is relatively limited, but would still be fairly effective. We could also continue to coordinate with many of them informally, since that would also continue to be in their interest. Eventually they might even seek to join the coordinating forum of the developed countries, although the terms of reference and voting basis might be much different from ITU.

It seems likely that ITU—or that part that deals with radio matters, as opposed to telephone and telegraph—would disintegrate if the principal developed countries abandoned it. A major mechanism for technical assistance to developing countries would disintegrate with it, leading perhaps to negotiations for a new mechanism. Probably these negotiations would be conducted on a basis that would more nearly reflect the relative technical and economic strengths of the various nations involved, rather than the ITU's "one-nation, one-vote" formula.

In the resulting "free-for-all" atmosphere, large nations and organizations would probably get whatever spectrum they needed, subject only to coordination among themselves. In the short run, smaller nations could take whatever spectrum they wanted.

But in the long term, if the larger nations developed technology and systems for their own purposes, rather than for common usage, the smaller nations could find spectrum unavailable, or perhaps limited to those frequencies that are complicated and expensive to use.

Overall, the lack of a central spectrum allocation and coordination authority would probably lead to a more fragmented use of the spectrum, with fewer common worldwide channels, less standardization, and possible difficulties with interoperability of certain common systems, and a general increase in interference problems between services. In short, the result of spectrum preemption and withdrawal from ITU would lead to a relatively less organized mechanism for spectrum management having significant disadvantages for both developed and developing countries. Whether these disadvantages would at some time be outweighed by the benefits of increased access to frequency bands vitally needed by the United States would depend on the specifics of those needs and the degree of conflict present in ITU at that time.

The results of the OTA-sponsored survey show that a clear majority of the survey respondents would strongly oppose, or even consider U.S. withdrawal from ITU. Nearly two-thirds of the respondents strongly disagree with the suggestion that the United States view withdrawal from ITU as an option even under hypothetical "worst case" conditions. And 18 percent of the respondents agreed or agreed strongly with the suggestion that the United States consider withdrawal from ITU.

Policy Option No. 2: Revised ITU Voting Formula

As an option less drastic than withdrawal from ITU, the United States might join with other developed nations to force a revision of the ITU's "one-nation, one-vote" decision-making formula toward one that would reflect the dominance of the developed nations in the actual use of the spectrum. If successful, this option would greatly reduce the ability of the Third World nations to block or force changes in U.S. positions.

One possible formula for revised voting is a combined weighting factor based on land area and population. Another possibility is the proportion of present use of telecommunications, or investment in telecommunications, which would clearly favor the developed countries in the short run. A third formula might be based on the relative proportion of overall contributions to the United Nations and its various specialized agencies.

There are numerous precedents for unequal voting arrangements in international organizations. In the INTELSAT board of governors, voting is in proportion to investment in the system (which is in turn proportional to utilization of the system), and voting in the World Bank is in proportion to contributions. There are, of course, a number of agencies and conferences which adhere to the "one-nation, one-vote" principle. Examples are the United Nations Educational Scientific and Cultural Organization, the International Labor Organization, and the Law of the Sea Conference. None of these is an operational organization, and none is especially well known for reaching accommodations efficiently and expeditiously.

A revised voting formula might reduce the contention over spectrum allocation matters at ITU; make ITU more efficient; help to make the use of the spectrum more efficient by precluding the adoption of unworkable allocation schemes; and be no less fair than the voting practices used in a number of other international bodies that benefit Third World nations without being controlled by them. The stimulus for concurrence of Third World nations with such a proposal would be the possibility that, were it rejected, the developed countries might withdraw from ITU and render it essentially irrelevant.

The reaction of Third World nations is difficult to predict but it seems most likely that they would bitterly resist any reversal of their recent successful trend toward assertiveness and refuse to make any concession on ITU voting formulae. From a general foreign policy standpoint, it is important to consider how much support the United States might obtain from other developed countries, many of which do not feel the spectrum problems as acutely as the United States. The United States must also consider whether it wishes to take an assertive policy toward ITU apart from a generally more assertive stance toward Third World nations. Should spectrum and communications policy be the "leading edge" of a new U.S. posture of asserting our interests vigorously? This issue needs to be faced early, in the broadest possible forum, since the answer will be one of the key factors in the selection of any policy option.

It can also be asked whether the proposed change in voting arrangements should apply to all ITU spectrum decisions, or just to those allocations that might qualify as major matters. The latter case is equivalent to establishing a new, separate forum with revised voting arrangements and routing the major matters to that forum rather than to ITU.

Objectively, it would seem that the interests of the developing countries lie with the continued existence of ITU and with continued technical and economic aid from the developed countries. If this choice were clearly and convincingly drawn, the Third World nations would probably come to realize that these benefits outweigh such hypothetical advantages as satellite orbital slots that they may never use. Whether they would ultimately decide the matter on objective grounds is difficult to predict. In any event, it seems unlikely that a change in the voting formula within ITU will occur given the present structure of ITU.

Policy Option No. 3: Increased Regionalization of ITU

At present, ITU divides the world into three geographic regions and many issues that can be treated separately and effectively in a single region are considered in this way. Regional administrative radio conferences are scheduled on a variety of specific issues, allowing the World Administrative Radio Conferences to "spinoff" certain controversial matters. One option would be to extend this process of regionalization on a geographic basis to smaller subregions, and/or on an issue basis to include only those nations directly affected by the particular issue. The purpose would be to reduce the number of nations debating or voting on issues that do not affect them directly, thus reducing unnecessary contention.

WARC-79 was attended by 142 nations. Approximately 1,670 delegates and advisors met for 11 weeks (one week more than scheduled), considered nearly 17,000 individual proposals (more than 900 from the United States), and held more than 900 meetings. Surely any approach that might help limit further WARCs to more modest proportions would be worthy of study. More importantly, when nations vote on issues that do not directly affect them, opportunities for trading votes arise at no cost to themselves, but which help others to sustain confrontations. Large meetings also tend to encourage bloc voting, which has already begun to emerge at ITU. Thus, subdividing the ITU into smaller units, either on the basis of geographic subregions or on the basis of particular issues, would divide the Third World bloc into smaller, less dominant groups.

There are numerous precedents for this. In addition to the three ITU spectrum regions, there are five International Telegraph and Telephone Consultative Committee regions, three ocean basin groups within INTELSAT, and a North American Regional Broadcasting Agreement, which coordinates broadcasting in the United States, Canada, and Mexico.

While a potentially useful approach, and one ITU has tried to some extent (e.g., the forthcoming WARCs on Mobile Services, high frequency planning, and the geostationary satellite orbit), decentralization is not applicable to all problems. Some services cannot be considered separately from others with which they interfere. Frequency bands in which signals propagate for many thousands of miles cannot be considered on a regional basis, and some issues (e.g., interoperability of aircraft communications systems) are fundamentally global in character. The key is to define a spectrum problem in a way which leaves significant numbers of nations unaffected. For example, the ultrahigh frequency TV and microwave fixed (radio relay) service, which use signals of limited propagation range, might be treated on a subregional basis.

Decentralized decisionmaking does not, of course, guarantee that the U.S. position will prevail. Being outvoted by 10 to 1 is no more satisfying than being outvoted by 153 to 1. However, it is easier to bargain in detail with 10 nations than 153; and if a quid pro quo must be offered, the total cost is likely to be lower.

The mechanics and economics of increasing substantially the number of conferences is also important to consider. The limited U.S. professional staff available to prepare for and attend spectrum conferences is already stretched thin, and if the United States does not wish simply to skip many of the meetings (a very risky propositon) this staff would need to be augmented. The developing countries would find it even more difficult to prepare for a heavy schedule of meetings.

Developing countries tend to have very few professionals available to consider spectrum matters; a few key people might decide spectrum policy for an entire country. Also, in some cases even the key individuals lack sufficient expertise to comprehend the needs and technical requirements of their own country, let alone understand and appreciate the complex spectrum problems of the United States. Assuming that this effect overbalances any possible advantage to the United States from keeping them in ignorance, it may be in our interest to assist these nations in their planning and conference preparation.

One way to assist the Third World nations would be on a regional basis. This could take the form of providing special regional rapporteurs; of educating and assisting key countries, which would in turn assist others or act on their behalf; or of establishing and supporting a joint planning capability for a group of nations in a region. Apart from the regional approach, we could assist certain country blocs in their planning and preparation.

Increased decentralization of ITU could, in principle, lead to greater fragmentation in the use of the spectrum, with the same band being used for different purposes in different regions to a much greater extent than is now the case. Advanced technologies may increase the opportunity for regions and subregions to operate reasonably independent of one another. While this may be acceptable in the short run, the long-term implications are worthy of study. If, for example, a new service were proposed that would be global in character, obtaining the necessary global spectrum allocation might require changes in the allocations to many different services in many different locales. At the least, it might be necessary to create an institutionalized system for coordinating decentralized decisions.

Policy Option No. 4: Better Coordination and Planning

As a relatively conciliatory approach, the United States could mount a major effort to develop long-term plans for spectrum use that would take into account the spectrum requirements of developing nations, to aid them in understanding the realistic options available to meet their short- and long-term needs, to offer them such technical and economic assistance as might be needed to enable them to participate actively in the planning process, and to seek their concurrence with fair, objective, and realistic proposals.

The acceptance at WARC-79 of U.S. proposals for new spectrum allocations devoted to remote-sensing activities offers support for the view that advance coordination and a concerted effort to explain and justify requirements can have a significant impact on countries that might otherwise be skeptical or indifferent. The delegation of Senegal came to WARC-79 with specific instructions to support U.S. remote-sensing proposals, thanks to a special effort by the National Aeronautics and Space Administration (NASA), backed by the State Department, to enlist the help of U.S. embassies overseas in lobbying appropriate authorities in their host countries. A NASA slide presentation, with tape-recorded commentary in English, French, and Spanish drew appreciative audiences from delegations at the conference itself. Of the some 50 remote-sensing proposals made by NASA for both passive- and active-sensing programs, all were accepted by the conference to a greater or lesser degree and, contrary to expectations, there was no opposition to U.S. proposals that could be traced to political motivations.

To a significant extent, the confrontations initiated by Third World nations in ITU are based on suspicion and mistrust of developed countries, perhaps based on a lack of understanding of the true potential of technology to create the spectrum resources they will need in the future. But many Third World nations also question whether they will be able to take advantage of that technology and they question the good faith of the developed countries to share the benefits of advanced technology.

The fact remains that there is adequate spectrum for all nations at the present and that technology will very likely expand the effective utility of the available spectrum to satisfy future needs of all nations. The problem for the United States is to convince other nations, particularly the developing countries that spectrum and orbit capacity will be available and that their needs for service can be satisfied. Technical assistance can be very useful in this regard, and economic assistance can help make the benefits of technology a reality. Creating a role for the developing countries in cooperative planning efforts is likely to make them more receptive to the positions and plans that are forthcoming, even though they benefit both the developed nations and themselves.

Long-range planning of spectrum utilization is presently inadequate and not easily accomplished in an area where technological rate-of-change is rapid and in an open competitive system like that in the United States where policymakers are more likely to be responding to problems than to be developing long-range plans. However, better long-range planning for telecommunication service and spectrum needs is clearly necessary in order to cope effectively with the ITU allocation process. Developing and sharing planning techniques and data with other countries would not make a new planning process vastly more difficult or costly, and might make it more reliable in the long run.

It is also necessary to know the extent to which developing countries' positions at ITU are based on their own vital interests rather than on misunderstandings and politics; it is unlikely that they would compromise vital interests for the sake of comity. A cooperative planning process would tend to expose true interests and clarify the negotiations.

As a practical matter, the majority of the developing countries cannot now make use of advanced communications technology without technical and economic assistance from technologically advanced countries. If the majority of nations were to vote to adopt rules that limit or preclude the use of advanced technology to which they do *not* have independent access, communications capability suffer and costs increase in the long term for all users. Thus, the cost of assisting other countries in using advanced technology must be balanced against the cost to the United States of *not* being able to take full advantage of such technology ourselves. This equation deserves close analysis.

It can also be argued that giving technical and economic assistance to the Third World nations will simply provide them with the sophistication they need to challenge our own positions more effectively in the future. While not invalid on its face, this argument ignores our ability to live in relative harmony with dozens of highly developed nations, and to avoid excessive contention in spectrum allocation matters with some of these nations that are sworn enemies. We have more to lose from ignorance than from true disagreement.

It is useful to recall what can happen in the absence of cooperative planning. As preparation for the 1977 Broadcast Satellite WARC, the United States developed comprehensive data and explanations to show that a technologically based "first-come, first-served", or evolutionary approach, would assure adequate access to the geostationary satellite orbit for all nations. However, other nations were intent on adopting a rigid a priori plan and simply were not interested in the U.S. arguments. Most of the U.S. preparatory work was of little value and the U.S. delegation was thus forced to develop alternative positions on an ad hoc basis, during the conference.

This experience serves as a reminder that it is no longer feasible to go to an ITU conference with a well-documented technical solution to a problem and expect other nations to embrace the U.S. position. A certain degree of advance coordination is necessary, as a minimum, and probably was one of the reasons that the United States achieved certain objectives at WARC-79. The prior coordination undertaken by NASA on U.S. remote-sensing proposals is a case in point.

Cooperative planning has worked in the past; the United States was a leader in cooperative planning for INTELSAT and INMARSAT. The exact mechanism for cooperative planning is an important and complex matter, compounded by divided responsibility in the United States for communications policy in general and spectrum planning in particular. It should be possible, however, to graft onto the existing structure a sufficiently comprehensive mechanism with high-level Government responsibility to assure effective long-range planning and to foster cooperation with other nations.

As an alternative, ITU could be invested with a planning staff to undertake long-range coordination, analysis, and planning. Such a neutral planning expertise might be less likely to be mistrusted by Third World nations, and perhaps more capable of defusing potential disagreements. Naturally, the United States would participate in the process and perhaps could more easily influence a planning process, in which the measure of power is technical expertise, rather than an ITU conference, in which the measure of power is votes. The United States has consistently opposed any increase in the power of the ITU, particularly efforts to expand the planning role of the International Frequency Registration Board (IFRB).

A broader, more extensive, and more conciliatory approach to international spectrum planning would be required under this option and could have a real chance of working, given some major changes in the U.S. approach. In the long run it could be the least expensive and most effective option available to this country.

Policy Option No. 5: Common-User System

As an alternative to contention for geostationary satellite orbit slots, the United States and other developed countries could enter into a joint venture with developing countries to construct, launch, and operate a common satellite system to meet domestic needs for telecommunication and/or broadcast services. The developed nations would provide the private capital and technological resources necessary to construct and launch the system, and would operate and manage it in conjunction with other using nations. All nations in the joint venture would have the option of purchasing a share of the common enterprise, up to their actual percentage of use of the system, and sharing proportionately in any profits. Such an arrangement would be similar to that governing the INTELSAT global satellite system used for international telecommunication. High-capacity satellite systems employing technology to make a common-user system economic and operationally attractive to developing countries for domestic services is needed to make a common-user system for domestic services viable. Such a system could be part of the existing INTELSAT structure or a separate structure established for this purpose.

Many developing nations are concerned that the satellite orbit locations are being occupied rapidly on a "first-come, first-served" basis, and that by the time they are in a position to use satellite systems there will be no desirable orbit locations left for them. It seems clear that the requirements of developing countries will be for satellite service and not for satellite orbit locations that they may not be able to use. This option would provide service without allocating dedicated orbit locations for individual users.

Moreover, the cost of developing and launching a dedicated satellite system is very high, well beyond the capability of most developing countries for the foreseeable future. This option could provide satellite service well in advance of the time these countries could afford their own systems, and much more cheaply. No large initial capital investment would be required from user nations, and there would be little risk. The technical expertise required to use such a system is far less than is needed to construct one.

This is not a new concept. The precedent for such an initiative is the global INTELSAT satellite system. Today 106 countries, the great majority of them developing, share in the management and operation of the satellites that have been optimized for international usage.

A further indication of INTELSAT's success, and of the developing countries' stake in the INTELSAT organization has been that organization's evolution towards playing a larger role in provision of domestic satellite services. In 1974, Algeria proposed to lease spare INTELSAT capacity for enhancement of its domestic telecommunication network. Since then a total of 20 countries have leased capacity from INTELSAT for domestic services and an additional 15 countries have expressed interest in leasing capacity in the next 2 years. By mid-decade, the total number of clients could easily grow to 50 countries.

INTELSAT has responded to this demand by committing itself to include planned domestic capacity, as opposed to relying solely on preemptible, spare capacity, in future generations of satellites and has also sought to develop higher powered satellites to be compatible with the small ground stations that have proven to be the most economical for domestic services.

While this policy option does not address the full range of problems before ITU, it does offer the prospect of relieving the pressure on a particularly important and contentious issue. If low cost and technically attractive domestic satellite capacity is made available through an international organization that accommodates the sovereignty interests of each country, many developing countries could come to see access to orbital slots and satellite frequencies as a side issue with availability of service being the main objective. Adoption of the common-user system alternative would free-up orbital slots for those major developing countries that continued to desire their own separate domestic systems whether for political reasons, or because requirements justified such a system economically.

A common-user system need not require any Government funding by the United States. Sufficient capital and technical resources exist in the private sector in the

United States, and within Europe and Japan to construct such a system as a commercial venture with expectations of future markets for follow-on equipment and services. Alternatively, such systems could conceivably be initiated with World Bank loan guarantees.

In summary, to the extent that developing countries can be persuaded to evaluate their needs for domestic satellite service apart from political considerations, they may come to believe that a common-user system can serve many of these needs at an early date and more cheaply than can dedicated systems, which could be many years away. Whether operated by INTELSAT or by a separate organization, whether financed with public or private funds, such a common-user system could relieve the pressures now creating the international tensions over use of the geostationary satellite orbit. And while not a precedent in any specific way for dealing with the broader range of ITU spectrum problems, a successful common-user system might at least show that difficult problems can in some cases be removed from ITU for separate treatment.

Policy Option No. 6: "A Priori" Allotment

The United States could agree to participate with other nations in the development of a long-range plan for the utilization of satellite orbit locations to serve participating nations' domestic communications requirements. This plan would assure that orbital slots would be available for the use of all nations when needed. In exchange for this agreement, the developed nations would likely insist that the plan be based upon sound operating principles and updated regularly to take account of the latest, most efficient technology available. Technical planning assistance would be provided.

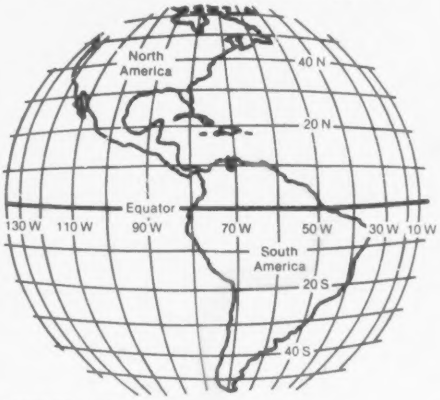
A priori allotment of satellite orbit slots has been a cause celebre among developing countries and at WARC-79 a resolution was adopted to consider this issue at a two-part space WARC in the mid-1980's. The United States and others have opposed a priori allotment plans for satellite service as wasteful and inhibiting to technological advancement. Although this option goes a long way toward accommodating the position of the developing countries, need not be adverse to U.S. interests. It maintains a substantial degree of flexibility important to the United States including the key qualification of a requirement for regular technological updating that would help to avoid the worse consequences associated with rigid allotment schemes like the one adopted at WARC-77 for regions 2 and 3.

As far as the United States is concerned, certain types of a priori allotment plans would not be as objectionable as others. Plans based on sound engineering and operational parameters might be workable internationally, at least on a regional basis. Indeed, U.S. domestic satellite operations are based more or less on an a priori approach. In the long run, the United States may have enough satellite capacity made possible by advanced technology to meet domestic needs even if the orbit and spectrum available to U.S. satellites is reduced. In the short run, the United States already has substantial numbers of operational satellites with additional satellite systems planned for operations in the near future.

In addition to the possible advantages that may result from updates to presently unforeseen technology, there are two factors that may help reduce the impact of a priori allotments on the United States. One is advanced technology including cellular satellite technology, already on the drawing boards, which will permit the construction of large, wideband satellites that can provide very large capacity from a single orbit slot. The other factor is the particular geography of region 2 (North and South America). As far as the geostationary orbit is concerned, region 2 is naturally divided into two parts—those nations located in the Northern Hemisphere and those in the Southern Hemisphere. A second geographic factor that serves to separate the hemispheres is the displacement in longitude of the nations in the two hemispheres (see figs. 4 and 5). Moreover, those nations situated close to the Equator enjoy the widest possible visibility of the geostationary satellite orbit from within their borders and have the greatest flexibility in positioning satellites in that orbit.

Limitations on the number of satellites that can be placed in the geostationary orbit is the fundamental factor that must be addressed to arrive at a solution to equitable access for all nations in region 2. The capability of the geostationary satellite orbit is primarily limited by the need to separate satellites operating in the same frequency band. When serving the same or adjacent coverage areas are not in close proximity, the required separation between satellites serving these areas may be significantly reduced. For example, current U.S. requirements for separation between satellites in the fixed-satellite service serving a common coverage area is 4 to 5 degrees. However, a satellite serving the United States and another one serving a South American country, if properly designed, could be essentially colocated without harmful interference.

Figure 4.—Displacement in Longitude for Countries in the Northern and Southern Hemispheres



SOURCE: Office of Technology Assessment

A plan could be devised to take advantage of the geographic and technological factors discussed above, which would serve to isolate the capacity of the geostationary satellite orbit into subregional areas. Specifically, it is technically feasible and could be operationally practical for the geostationary orbit to be used by nations of North America essentially independent of the use of the orbit to be used by nations of South America. Moreover, the North American Continent consists of three countries with very large land areas that make the use of advanced technology using shaped-beam antennas attractive. Except for some possible coordination problems near the border areas, it may be possible to reuse the entire orbital arc separately for each of the three countries.

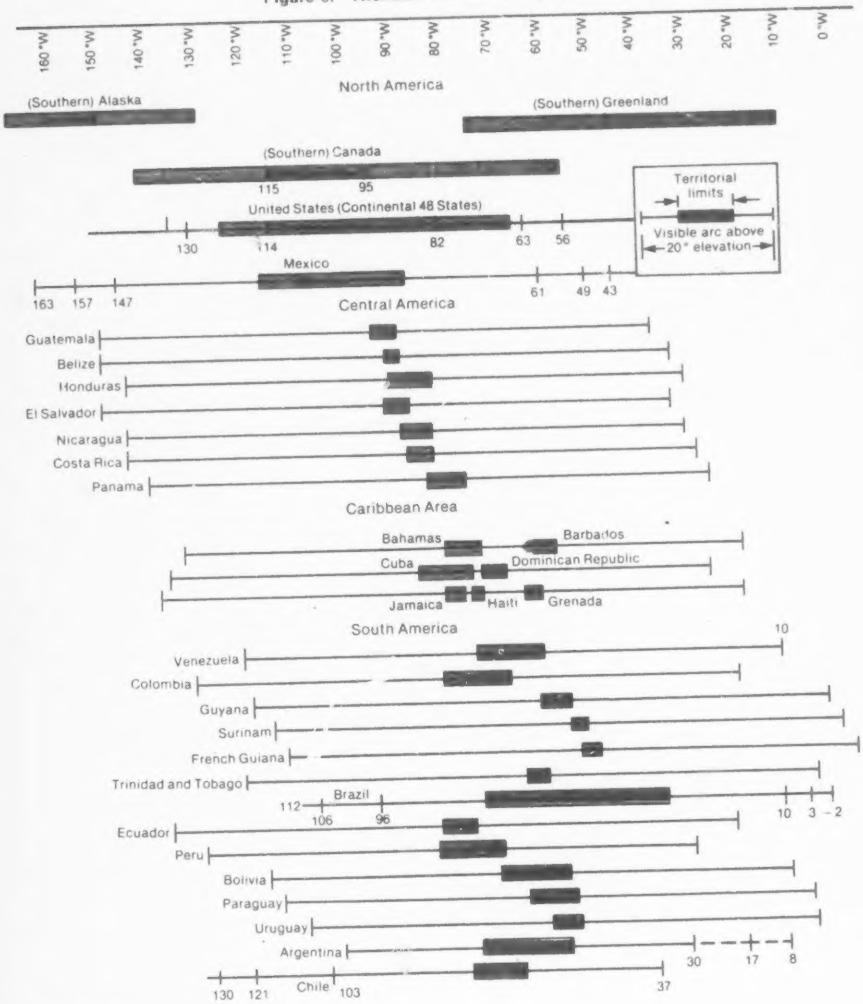
The implications of this approach and its linkage to the policy options discussed above are as follows:

1. This solution will require both coordination and planning by the member nations of region 2 (Policy Option No. 4).
2. This solution would essentially lead to a subdivision of region 2 into two parts (Policy Option No. 3).
3. The practical use of a common-user system would be enhanced by this approach (Policy Option No. 5).

Although an a priori plan is implied in the approach, it could be implemented without the adverse limitations of a rigid a priori plan such as adopted at WARC-77. If this approach is possible, then an a priori allotment to one country would not preclude using the same allotment for others if certain technical and operational guidelines were followed.

There may even be some benefits to the United States from adopting an a priori allotment plan. At present, there is considerable uncertainty about the outcome of the 1983 Region 2 Broadcasting Satellite Administrative Radio Conference and the Space Planning Conference in the mid-1980's. If a decision is postponed, the uncertainty would continue. A situation would then be perpetuated in which any existing

Figure 5.—Available Geostationary Arc



SOURCE: J. D. Barnia.

domestic satellite orbit slot may potentially be withdrawn in the future. Moreover, no satellite system designer could plan the logical evolution of a proposed system with confidence that the required additional allotments would be available.

It is also important to examine the tactical aspects of agreeing to an a priori allotment policy. By participating in the development of a plan, the United States would be in a position to influence the type of plan adopted and possibly gain concessions on other issues of importance to the United States.

In short, the linkages and tradeoffs among these and other possible approaches to future use of the geostationary satellite orbit cast each U.S. policy option in a different light. Careful review in each case is needed for sound policy formulation. Rather than rejecting a priori allotments as inherently wasteful, it may be in the U.S. interest to examine the principle, to modify it to avoid its worst aspects, to examine the practical effects, to examine the possibility of a quid pro quo, and if the result looks acceptable, to work with the developing countries to implement the plan.

The results of the OTA-sponsored survey show that the majority (68 percent) of the respondents believe that a practical compromise is possible and desirable between the evolutionary approach and a rigid a priori plan for use of the geostationary orbit. Another 15 percent of the respondents think that a compromise is possible but undesirable from a U.S. standpoint. Only 8 percent of the respondents said that a practical compromise is impossible.

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Chapter 6

Findings, Conclusions, and Observations

Introduction

The telecommunication systems of the United States are the most sophisticated, efficient, and all-encompassing in the world. These systems are a vital element of our economic strength and security; they are an essential part of our culture. Other nations, recognizing the key role that telecomunication plays in national and international affairs, are constantly striving to surpass the United States in technological inventiveness and in the practical exploitation of the many telecommunication subsystems that make up the modern "information society."

As a leader in technology, the United States has been able to proceed with its domestic telecommunication programs more or less independent of international concerns. The United States has played a major role in shaping what has been essentially a benign and passive international mechanism responsive to the task of providing order to the key element in 20th century communications—the radiofrequency spectrum.

This international regime is coming under considerable stress as the result of sharply increased demand for new communication services and resulting congestion in key parts of the radio spectrum. WARC-79 and related international conferences and meetings demonstrate conclusively that contention for access to radio spectrum and its important collateral element, the geostationary orbit for space satellites, presents new and urgent challenges to vital U.S. national interests.

Given the complexities of spectrum management in a changing world environment and the increased importance of telecommunication to both developed and developing nations, it is highly unlikely that traditional U.S. approaches to these issues will be sufficient to protect U.S. vital interests in the future. The growing differences among nations over the use of the radio spectrum and related satellite orbit capacity are reflected in the Final Acts of WARC-79.

Overall, the results of WARC-79 are mixed. Generally, the proceedings of an administrative conference of the International Telecommunication Union (ITU) are geared toward arriving at decisions and adopting provisions that are acceptable to all nations. It is expected that all nations will report favorable results with certain exceptions identified. Even then, a country is free to take a reservation and not be bound by specific unacceptable results. Therefore, finding a useful way to measure success and evaluate a country's relative standing following an administrative radio conference is not easy. Comparing specific U.S. proposals submitted to the conference with the Final Acts of the conference is not a straightforward exercise. Too many events intervene to color the comparison between the preconference position and the ultimate result on many important issues. While such a comparison is important, it does not reflect the underlying reasons and motives for particular decisions, the problems encountered or any apparent trends important in evaluating results of an administrative conference.

It is important to understand the intervening events that underlie decisions, not only to evaluate the results of WARC-79, but to prepare for the many future conferences of consequences for the United States. As a highly developed user of spectrum and a world leader in telecommunication technology, the United States has much to offer and much to lose in the international process of establishing rules and regulations.

Principal Findings of the OTA Study

The most significant findings of the study are the following:

1. There is an urgent need for higher level attention to Government policy coordination and accountability for international telecommunication issues generally and for spectrum management issues and international negotiations specifically.
2. Streamlined processes, coordinated Government policies and sufficient resources on a continuing basis are essential to effective and timely preparation for the several major international conferences of ITU now scheduled to occur over the next 7 years.
3. New U.S. approaches are necessary to address radio spectrum and related satellite orbit issues in a changing world environment. Solutions to satellite orbit allocation and spectrum reallocation issues as envisioned by the Third World nations require strategies not yet developed or tested.
4. WARC-79 resulted in the loss of some U.S. flexibility in certain key spectrum areas—particularly those affecting national defense—and enhanced opportunities in many other areas.
5. Operating costs will increase for certain radio services; interference protection will become less certain; and administrative costs will need to rise to adequately implement WARC-79 decisions and to prepare for future radio conferences.

General Observations and Trends

- The world environment for telecommunications has changed significantly in recent years; two-thirds of the 155 member nations of ITU can be classified as developing or Third World countries.

- The United States must develop approaches to use its technology and expand its influence if future actions in a "one-nation, one-vote" forum, like ITU, are to be favorable to U.S. positions.

- There has been a gradual shift toward recognizing the legitimacy of nontechnical factors such as political and cultural interests and values in ITU deliberations. In other international forums, Third World countries have raised related issues under concepts of the New World economic order and New World information order.

- There are basic differences between the United States and Third World countries over the principles that should govern the allocation and use of radio spectrum and related satellite orbit capacity. There is increasing need to identify and assess middle range options to reconcile the sometimes sharply divergent goals of developed and developing countries.

- The disparity between nations in their ability to use the spectrum is growing; this leads to growing disagreements over the allocation and use of specific frequency bands for specific services.

- Third World countries are increasingly able to influence and shape international communication policies in international forums.

- Spectrum decisions arrived at as a result of voting within ITU, as opposed to the commonly practiced consensus approach, will tend to be increasingly adverse to the United States.

- U.S. requirements for access to the frequency spectrum and satellite orbit locations are expanding with the explosive growth in telecommunication/information technology, the growing use of satellites, and the increasing dependence on radio and satellites for military and national security purposes.

- International telecomunication development is entering a phase in which regional and domestic needs and policies will predominate, as opposed to more general global facilities expansion. The thrust will be on intraregional communications and the development or enhancement of interregional communication routes.

U.S. Policymaking Structure and Processes for Spectrum Management and International Strategies

Need for High-Level Government Policy Coordination and Accountability

- The responsibility for spectrum management and policymaking is divided among several Federal agencies with coordination conducted on a structured, but often informal, basis without clear responsibility and accountability for policy at a high level of Government.

- The United States does not have a consistent and coordinated national telecommunication policy because of a lack of appreciation and concern at the top levels of Government and industry, a lack of high-level policy coordination for international telecommunication negotiations, and a failure to assign sufficient importance to international telecommunication matters, including spectrum management and the State Department's role in international negotiations.

- The United States is not adequately equipped to provide comprehensive assessments required to effectively plan for the future use of the radio spectrum, to forecast future requirements, to assess the costs and benefits of shifts to new technology, or to evaluate alternative strategies to deal with international issues regarding allocation and use of radio spectrum and the geostationary satellite orbit.

- Within the U.S. telecomunication industry there has been significant growth and change over the past 15 years, which has produced more competing domestic interests with conflicting demands for spectrum use.

- The United States' permanent spectrum management mechanisms are not adequately equipped to review and verify all the stated requirements of Government and nongovernment spectrum users and to adjust needs consistent with national policy objectives. The U.S. lacks an effective ongoing means of collecting data, developing and adjusting guidelines to evaluate the merits of one spectrum use over any other.

- The State Department's International Communications Policy Office is not at a high enough level in the Department's organizational structure to be in a position to prepare adequately for all the important upcoming conferences of ITU and make its influence felt in the upper echelons of Government and industry.

- Lack of high-level concern has also led to a shortage of trained and experienced spectrum management personnel to replace those retiring from Federal Government service; there has been insufficient attention to the need for personnel with supplementary diplomatic, language, negotiating, economic, and legal skills.

- The rather general wording of Executive Order 12046 establishing the National Telecommunications and Information Administration (NTIA) leaves it ambiguous as to how far NTIA can go in its coordinating role with respect to U.S. international telecommunications policy, particularly when that mandate risks encroachment on the general regulatory responsibilities of the Federal Communications Commission (FCC).

- The schedule of 10 major international conferences over the next 7 years to consider a number of issues vital to U.S. interests underscores the fact that the United States must reform its policymaking mechanisms and streamline the cumbersome and time-consuming procedures for developing U.S. proposals for international telecommunication conferences.

- A mechanism is needed for collecting and evaluating information on the perceived needs of other nations for spectrum and orbit resources; their receptivity to intraregional and/or common-user systems, and other factors.

Need for New Strategies to Address Spectrum and Related Satellite Orbit Issues

- There are critical years ahead for ITU. For the most part, the manner in which activities have been conducted by telecommunication experts and international diplomacy has avoided debate on ideology and politically motivated objectives. The trend toward basing decisions on factors other than economic and technical matters, and demonstrated need is challenging ITU to provide mechanisms for resolving differences among nations without a further shift toward the polemical norms common to international political debate.

- Third World countries are likely to resist drastic changes in ITU rules and procedures that operate on the principle of "one-nation, one-vote" and that provide them with increasing influence and power. They will continue to seek technical assistance from the developed countries while pursuing compromises favorable to their own interests.

- The developed countries are expanding their use of spectrum to higher frequency bands as lower, more economical bands become congested. They rely on technology to provide solutions to problems of accommodating new demands in the future. It is becoming increasingly difficult for the developing countries to accept the proposition that they will have access to spectrum on an interference-free basis at some future date as their needs materialize. The outlook is that the radiofrequency spectrum and geostationary orbit will become more congested in the lower, more economical and desirable frequency bands even though use of frequencies by one country does not necessarily preempt those same frequencies from use by other countries. It seems increasingly clear that the United States will need to explore new strategies and policy options to reconcile Third World interests with the objectives of the United States.

- WARC-79 showed the increasing influence of the Third World as a political force in ITU. The struggle for influence between the developed and developing nations will continue at future ITU conferences. At the present time, the developing countries derive their power from their collective numbers; the developed countries from their technical competence, knowhow, and leadership. The influence of the developing countries can most effectively be exploited in the ITU legislative forums; the developed nations through ITU technical administrative organs.

- The success of ITU has been due in large measure to the willingness of its members to adhere voluntarily to commonly arrived at agreements and regulations. The inherent flexibility in the ITU processes has also enhanced its effectiveness. Reservations and footnotes offer escape for individual countries from disagreeable decisions of the majority. However, excessive use of these exceptions by a sufficient number of countries—or by a few large users—serves to reduce the value of the agreements and regulations for all users.

- Existing ITU procedures that vest rights in the use of spectrum to countries on an "as needed, first-come, first-served basis" are viewed by developing countries as not serving their objectives and they now seek to alter those procedures.

- The growing lack of agreement among nations over which specific frequency bands should be allocated for which specific radio services (the International Table of Frequency Allocations) strongly suggests that mechanisms other than service classifications should be examined.

- ITU is a political organization that performs both political and technical functions. However, while there is a primarily technical focus for most ITU activities, there has been a gradual shift toward recognizing the legitimacy of nontechnical factors, such as political and cultural interests and values. The United States must recognize this shift and develop strategies to use its technology more broadly as a tool for resolving these broader international issues that are not subject to technical solution.

- Many of the nontechnical issues raised in ITU—like those concerning reallocation of spectrum and guaranteed access to the geostationary satellite orbit—are among the many issues raised by Third World countries in other international forums under the principles propounded by the New World economic order and New World information order. Those countries seek to alter the age-old pattern and structure of trade, communication, and information flow by developing and using telecommunication infrastructure themselves.

- Developing countries will continue to seek changes in the existing mechanism for vesting rights in the use of frequencies and access to the geostationary orbit. They seek a shift away from the current notification and coordination procedure on a "first-come, first-served" basis, toward a negotiated plan developed on an a priori basis. This is expected to reduce the uncertainties they fear in gaining access through the current approach, albeit at the expense of a possible "freezing" of technology.

- The administrative regulations of ITU serve the desirable objective—without the use of sanctions for noncompliance—of avoiding the interference, incompatibilities and chaos that would ensue if these or similar regulations were not followed.

- The voluminous, complex, and detailed provisions of the international radio regulations are becoming more burdensome for the world and less meaningful to individual users.

- Third World countries will continue to advocate changes in rules, regulations, and procedures that help guarantee their perceived right of access to the spectrum and geostationary satellite orbit. They do not wish to rely on the "good efforts," promises, and technical ability of the developed countries to "engineer-in" future systems on a case-by-case basis, as needed.

- ITU administrative radio conferences seek to produce results that all nations can accept. Reservations, footnotes and other means to reduce negative consequences allow each nation to more or less view the results as favorable. This approach supports the perception of having all winners and no losers. However, because of growing differences among nations, these procedures are beginning to produce diluted and cumbersome results that may render existing mechanisms to regulate world spectrum use less and less meaningful.

- Because of competing interests and growing differences over use of the spectrum there will be winners and losers in the future as a result of the ITU decisionmaking process.

- The preeminence of U.S. technological leadership and technical ability served the United States well in international spectrum negotiations when decisions were primarily based on technical matters. But more and more U.S. problems with other countries involving spectrum use are nontechnical.

- Certain U.S. requirements to use spectrum, such as radars for military purposes, are not of interest to the majority of other countries which prefer to have this same spectrum allocated to services they need or desire. The difficulty that faces the United States in seeking to convince a majority of the 155 other ITU member countries to adopt regulations that accommodate U.S. radars that conflict with other possible uses by other countries is real and was demonstrated at WARC-79.

- Rights to frequencies and satellite locations to individual nations are not vested indefinitely under current ITU procedures, and changes in operating parameters require recoordination and registration. This creates uncertainty for present satellite system operators. The risks may increase that spectrum and orbit will not be available to provide for continuity of service from the present to the next generation of satellites. Moreover, this problem is not overcome by the adoption of a negotiated rigid a priori allotment plan to assure future access, since such a plan would tend to freeze technology and accommodate only those new or second generation satellites that fit the original technical scheme.

Options

Possible Structural Improvements

There are three fundamental weaknesses in the present Federal Government policymaking structure:

1. The lack of attention at the top decision levels of the Government and industry as to the vital role of telecommunications in the international and domestic political, economic, and private affairs of the United States and the need for policy coordination;
2. There is a lack of high-level centralized policy coordination and guidance for international telecommunication negotiations at a high enough level in the Government to be effective.
3. The State Department's International Communications Policy Office is neither staffed nor institutionally organized to carry out effectively all of the functions involved in international telecommunication negotiations.

Congress could consider ways to improve the present structure or examine possible changes in the structure. A detailed analysis of alternative structures was beyond the scope of this study, which concentrates on the results of WARC-79. However, at least four options are available to Congress:

1. maintain the status quo and make no changes;
2. maintain the present structure, but raise the level of attention and accountability within the responsible agencies;
3. establish a mechanism—such as a task force of high-level government officials—to develop, examine, and make recommendations on structural and procedural improvements; or
4. establish a permanent board, council, or interagency committee of high-level Government officials to be responsible and accountable for international telecommunication policy coordination and the preparations for international conferences.

Possible Procedural Improvements

- Improvements needed in the present procedures for managing and planning Government and nongovernment use of the spectrum include better means to provide adequately for:

- evaluation and validation of spectrum requirements, giving particular attention to current spectrum usage, technology and development trends, and sharing opportunities between competing users of the spectrum;
- inclusion of spectrum and orbit efficient techniques and technology in system design of both Government and nongovernment systems;
- apportionment of frequency spectrum between Government and nongovernment services based on national priorities;
- effective planning for future spectrum and orbit needs;
- efficient and timely preparation for and participation in ITU conferences; and
- effective management of existing services and users on a continuing basis.

• Many of these shortcomings could be corrected without fundamental changes in the Government structure.

The validation of spectrum requirements, and the apportioning of spectrum between Government and nongovernment users, needs closer scrutiny. An enhancement of existing mechanisms using analytical tools to help evaluate needs and arrange priorities among contentious users would provide better information for decisionmakers. Military requirements are reviewed by the Interdepartment Radio Advisory Committee (IRAC) and its Spectrum Planning Subcommittee, but this function needs to be strengthened and broadened to be more effective in the future.

• Economic techniques should be considered, at least on an experimental basis, to provide guidance on the consequences of different spectrum allocation decisions and the introduction of newer technology. These should include techniques for evaluating the relative economic viability of alternative spectrum uses, as well as radio v. nonradio communication systems.

• FCC, perhaps with the aid of a task force including other Government agencies that have studied the question, industry groups and private experts, should select a few services and frequency bands for detailed analysis of the prospects of using one or more economic techniques. The Commission could then present its recommendations for the experimental application of a selected technique, or techniques, on one or a limited number of services and frequency bands to the Congress for its information and action, if necessary.

• Problems relating to forming a U.S. delegation for WARC-79 could be addressed and the effectiveness of U.S. participation in international meetings could be improved by several steps:

1. industry and other nongovernment delegates could again be permitted to participate fully as U.S. representatives at international telecommunication conferences and take any assignments on the delegation for which their skills and experience qualify them;
2. consideration could be given to finding means to comply with due process requirements under the Administrative Procedure Act and still name industry and other nongovernment representatives to delegations on a timely basis;
3. permanent guidelines to name the chairman and individual delegates to the U.S. delegation could be established;
4. qualifications required, distribution of various skills needed, and type of representation desired could be determined at an early stage of preparation for conferences;
5. individuals chosen to serve on U.S. delegations could be selected from the best candidates available, especially those who participated in the preparatory effort; and
6. any special Government support necessary to acquire particular representation on the delegation could be available early in the preparatory stages.

• Preparations for international telecommunication conferences could be improved by replacing the ad hoc approach with an ongoing conference preparatory structure with a focal point for high-level responsibility and accountability involving all the concerned Government and nongovernment telecommunication interests.

Strategies to Address International Issues and Deal With ITU

The United States must make some policy decisions reflecting changes in U.S. strategy or in the structure or procedures of ITU, and then augment the scope and training of the responsible U.S. personnel consistent with those decisions.

The United States has essentially two alternatives: 1) it can seek various improvements in the present means for solving spectrum allocation problems within ITU as it is now constituted; or 2) it can seek to alter the existing structure, procedures, or mechanisms of ITU itself. The policy options considered here may be divided into two broad categories, strategic and structural.

Strategic Approaches – Options

- From the strategic standpoint, assuming no significant changes in ITU, the United States has a wide range of options. At one extreme, the United States may conclude that the drawbacks of continued participation in ITU outweigh the benefits, and withdraw from the organization or decline to participate in its deliberations. At the other extreme, the United States may decide to yield to other nations on controversial matters, accept all decisions taken within ITU, and play a passive role in its deliberations. Between these extremes there are a number of alternatives.

1. Seek to remove the most controversial issues from the ITU forum and attempt to solve them in other ways. A current example might be to respond to the demands of developing countries for "guaranteed access" to radio spectrum and satellite locations by developing the institutional arrangements to ensure domestic communication services to qualifying nations. This could be a common user satellite system either building upon the present INTELSAT structure or creating a separate system for domestic services. Such a solution would offer each nation a role and stake in the system with satellite services or capability it could realistically use. This could avoid the issue of allocating to small nations significant amounts of the radio spectrum and satellite orbit locations which might then remain unused for the foreseeable future.
2. Develop a comprehensive program with necessary resources to better coordinate U.S. views and objectives with other nations, in advance of ITU meetings, and adjust U.S. proposals based on improved understanding of other nations' views.
3. Develop a range of options for "planning" the use of the geostationary satellite orbit—between the evolutionary approach advocated by the United States and any rigid a priori allotment plan that may be advocated by some developing countries—and consider these options informally with key countries prior to ITU conferences.
4. Seek to raise the level of technical competency among ITU member states and raise the level and quality of communications and information capabilities accessible to them through educational and technical assistance programs.

Structure of ITU – Options

- From the structural standpoint, assuming that ITU can be changed, a number of options are available. One relatively extreme option would be for the United States to withdraw from ITU. Another option would be to seek to revise the voting formula of ITU to one more advantageous to the United States, perhaps by giving added voting weight to those countries that contribute most heavily to the U.N. budget. A more modest option would be to increase the number of ITU regions beyond the present three so that regional issues could be dealt with by a smaller number of countries most directly concerned.

1. *Withdrawal from ITU*—Member nations of ITU rely on the organization to avoid interference from the radio signals of others and to achieve compatibility of interconnected telecommunication systems. Avoidance of interference is the essence of spectrum allocation or frequency assignment processes of ITU. Withdrawal from ITU could well intensify the risk of interference. It seems clear that preemption of radio spectrum by the United States would be ineffective and that U.S. radio services would be vulnerable to interference without recourse to the protections provided under the international radio regulations. Any nation that chose to interfere, whether due to a valid need for a particular frequency band or by intentional jamming, could greatly reduce the value to the United States of the preempted spectrum. Withdrawal from the ITU organization would not eliminate the mutual desirability for the United States and other countries to coordinate spectrum use as well as other telecommunication activities now performed through ITU.
2. *Revised ITU voting formula*—As an option less drastic than withdrawal from ITU, the United States might join with other developed nations to force a revision of the ITU's "one-nation, one-vote" decisionmaking formula toward one that would reflect the dominance of the developed nations in the actual use of the spectrum. If successful, this option would greatly reduce the ability of the Third World nations to block or force changes in U.S. positions. But those nations are likely to resist such revisions vigorously and given their current voting strength it is difficult to see how any weighted voting scheme could be forced in ITU short of amassing pressure in many other areas.
3. *Increased regionalization of ITU*—At present, ITU divides the world into three geographic regions and many issues that can be treated separately and effectively in a single region are considered in this way. Regional administrative radio conferences are scheduled on a variety of specific issues, allowing the World Administrative Radio Conferences to "spinoff" certain controversial matters (and incidentially, to delay their consideration). One option would be to extend this process of regionalization on a geographic basis to smaller subregions, and/or an issue basis to include only those nations directly affected by the particular issue. The purpose would be to reduce the number of nations voting on issues that do not affect them directly, thus reducing unnecessary contention and possibly reducing costs and time of reaching a multilateral agreement.

Consequences of WARC-79

General Observations

- ITU administrative radio conferences are difficult to rate in terms of success or failure. The box score approach, which measures proposals submitted against the conference Final Acts, is inadequate and misleading because it fails to take account of the importance and consequences of particular decisions. The underlying trends and the bases for decisions and compromises, which have important future consequences, are not captured in the win, loss, and tie columns.

- WARCs are conducted and apply mechanisms that allow each member-nation to perceive that most of its needs are met no matter how unfortunate the results may be for the collective international community.

- In general and apart from any specific proposal or action, the members of the informed community responding to the OTA-sponsored survey perceived WARC-79 as producing results that were either somewhat better than expected or about what was anticipated before the conference. However, expectations may have been colored by the growing concern over possible confrontation with the Third World that preceded WARC-79.

- The OTA-sponsored survey found that most individuals responding to the questionnaire believe that WARC-79 had a favorable impact on both U.S. national interests (53 percent) and their own organization (58 percent). The major exception to this view is found among a minority of individuals mainly in the private sector, who maintain that WARC-79 had a net unfavorable impact on their organizations' operations (15 percent). A substantial number of respondents (33 percent) said that the results of WARC-79 were neither favorable or unfavorable to U.S. national interests.

- The 1977 broadcasting satellite WARC was of great importance for the United States because it demonstrated conclusively that the developing countries could unite to pursue a collective goal. In this case, the goal was consistent with the objectives of the Western European countries goal (albeit for different reasons), but inconsistent with U.S. (and others) proposals and efforts to adopt a different approach based on technical arguments to support the U.S. position. It also showed that the perceptions and priorities of the developing countries differed from ours and that technical arguments could not be counted upon to win out over political considerations.

- At WARC-79, there was too much to do, too little time to do it, and too many conflicting interests to deal effectively with many of the issues. Therefore, the conference made use of the several vehicles available to an administrative conference to proceed without forcing agreements or attempting to resolve difficult issues that could be postponed. Taking footnotes to the allocation table; adopting resolutions; postponing issues to future conferences; and taking reservations are vehicles that have always been available, but at WARC-79 ITU members found it necessary to use them more than ever before.

- No immediate changes in operations using the radio spectrum or geostationary satellite orbit are required in the United States as a result of WARC-79. However, the longer range impacts in terms of increased operating costs, reduced operating flexibility, uncertainty surrounding important pending issues, and the need for thorough preparations to address issues at future conferences require immediate attention.

- The radio regulations serve essentially two functions: 1) to establish technical standards and regulations about what kinds of services can use what parts of the spectrum under given conditions; and 2) to establish procedures for countries to acquire operating rights and protection from interference. Developed countries participate in WARCs with a strong focus on improving and elaborating on technical standards and procedures to protect existing spectrum users; developing countries want to focus on underlying principles, alternative ways to vest rights in the use of frequencies, and ways to make ITU more responsive to their needs.

- INTELSAT, as a world organization of 106 member countries, had significant influence at WARC-79 on fixed-satellite service (FSS) matters.

- The nonalined nations played a significant role at WARC-79, frequently operating as an effective force.

- WARC-79 adopted several resolutions and provisions that call for increased assistance in various forms to developing countries.

- The conference resolutions calling for a number of future conferences, including those to "plan" space services and the international broadcasting service, demonstrate that the achievement of U.S. objectives at ITU conferences will no longer be a matter of reaching agreement on technical solutions to problems of spectrum allocations and frequency coordination; it will require imaginative approaches, with political negotiations involving long, hard bargaining.

Major Decisions and Consequences

- There is no major immediate cost impact imposed by WARC-79 regarding national security systems, largely because of the frequency flexibility of existing U.S. equipment, the success of the U.S. delegation at WARC, and reservations taken by the United States. However, there will be future, undetermined costs resulting from actions at WARC-79—costs associated with frequency management, the development and procurement of more sophisticated equipment, compatibility studies, and coordination to prevent harmful interference with competing users of the spectrum.

- Department of Defense (DOD) interests were impacted by losses of exclusivity for radiolocation (radar) operations and by increased sharing with other services in many of the radiolocation bands. For example, demands that radar operations be discontinued in certain bands in order to accommodate expanded FSS operations led to considerable acrimony, which was only eased by a nonbinding U.S. commitment in a formal declaration to try to accommodate FSS in those bands. The status of radiolocation was retained but the pressure from FSS interests will certainly continue.

- Radar usage by the radiolocation service is extremely heavy in the radiolocation bands between 8500 and 10,000 MHz. The addition of the radionavigation service and the multicountry fixed and mobile footnotes in this band have taken 900 MHz of virtually exclusive radiolocation allocations in the current radio regulations and added one or more primary services over the entire band. Technical and administrative solutions must be sought if radiolocation is to retain its effectiveness. IRAC, in particular, could develop a set of recommendations for use by the State Department in discussions with other countries with a view to encouraging the orderly and restrained introduction of radionavigation on an "as needed" basis in order to buy time for the development of technical solutions to sharing problems. In the absence of such a planned introduction, the radiolocation service may soon find itself having a de facto secondary status because of the safety-of-life priorities accorded the radionavigation service.

- The United States took a reservation indicating that the United States, in the operation of radars, will not guarantee protection to, nor coordination with, other services. The action was necessary because the existence of the fixed and mobile services footnotes in every radiolocation band between 1 and 40 GHz jeopardized radar operations to serve national defense.

- Notwithstanding the fact that WARC-79 did little to reduce the total spectrum available for radar operations, and also, that U.S. military radars are now required to operate worldwide in a secondary status, the costs of radar development and operation must increase as a result of decisions taken at WARC. New coordinating activity must now take place between the radiolocation service and a number of other services that will share the same frequency bands, particularly the fixed, mobile, and radionavigation services. A significant number of interference incidents can be anticipated in these bands. In the long term, modifications of existing systems and development of new ones must be increased to guarantee the performance of military radars in the presence of increased interference. A further added cost derives from the need for radar developers to expand their participation in CCIR in order to lay a better foundation for U.S. proposals concerning radars at future conferences.

- U.S. objectives for FSS and the mobile-satellite service (MSS) (including DOD satellite interests) were achieved in large measure. The DOD goal of adding 125 MHz for up- and down-links for the two services was achieved, but this meant that the partial exclusivity that existed for FSS was lost. There may be problems in satisfying some DOD satellite communication requirements in the 7- and 8-GHz bands. Also, the United States and most NATO countries took a reservation regarding language in the Final Acts that requires that stations in MSS operating in the band 235 to 399.9 MHz not cause harmful interference to those of other services operating, or planning to operate, in accordance with the table of allocations.

- Significant amounts of spectrum were added to allocations for FSS, in general accordance with U.S. objectives. The technical rules that affect the design, operation, and cost of satellite systems were generally in agreement with U.S. positions. Where U.S. desires were not precisely met, no significantly adverse repercussions resulted. No immediate or significant changes in the structure or operation of U.S. fixed-satellite telecommunication services will result from conference decisions. No operational or economic dislocation was imposed on any existing FSS system. No major burden appears to be placed on the U.S. Government or private operating entities in order to comply with the decisions of WARC. However, the differences between the United States and many developing countries over approaches to use of the geostationary satellite orbit, to be resolved by future conferences, leaves the impact on FSS uncertain.

- While, based on U.S. proposals, WARC-79 largely eliminated frequency sharing between FSS and broadcasting-satellite services (BSS) in the Americas, BSS must now share with the terrestrial-fixed service. This sharing could result in interference to BSS Earth-station receivers operating in the same area as fixed-station transmitters. This could have a negative impact on private microwave systems that use the band 12.3 to 12.7 GHz. These private systems are widely used in the United States by a variety of users. If required to vacate the band to protect BSS and move to a higher frequency band, there would be economic and operational consequences.

- WARC-79 made substantial increased allocations to FSS in the "lower" frequency bands where technology is well developed and relatively economical. WARC-79 also reaffirmed the FSS allocations near 20 and 30 GHz where the next generation of domestic communication satellites is now under development. This new generation of satellites is likely to offer a greater variety of services to more users and lower costs.

- Because of the highly efficient use already being made of existing allocations for the fixed service, the changes adopted at WARC-79 consisted mainly of attempts to aline the allocations among the three regions and, through footnotes, to accommodate the specific needs of individual countries.

- The decisions of WARC-79 affecting the use of microwave radio relay systems do not mandate any drastic U.S. changes in spectrum allocation and management.

- In order to simplify the administrative process for certain countries which otherwise might need to coordinate with a number of neighboring states, the radio regulations were revised and simplified at the risk of creating future interference problems. The changes were opposed by the United States, Canada, and others that felt that sound technical judgments should not be eroded by political or administrative considerations.
- The U.S. objective to gain more frequency allocations for high frequency (HF) broadcasting could only be done at the expense of the fixed service, and was therefore opposed by many developing countries. The HF broadcasting allocations were increased conditioned on the successful outcome of a specialized HF broadcasting conference to be held in the mid-1980's to "plan" for more efficient and equitable use of the broadcasting bands. While the conference agenda will be relatively broad and open, it was apparent at WARC-79 that the United States and the developing countries have significant differences as to the type of planning to be undertaken. Also, political issues, such as "prior consent," could prove troublesome, at this conference.

Options Regarding Ratification of the Final Acts of WARC-79

1. The United States can ratify the Final Acts without delay with the normal clarification of U.S. statements in the Final Protocol. Completing the ratification process prior to January 1, 1982, when the 1979 radio regulations enter into force will indicate to other nations our goodwill and determination to abide by our international obligations. The Final Acts constitute the "Radio Regulations, Geneva, 1979," which replace the 1959 regulations as partially revised by the administrative radio conferences held in 1963, 1966, 1967, 1971, 1974, and 1978. The Final Acts also incorporate the provisions of the 1977 broadcast satellite WARC as modified by WARC-79.

2. The United States can ratify the Final Acts with conditions, thereby underscoring and making explicit the reservations taken at Geneva. In particular, the United States could reiterate the reasons for taking reservations in the Final Protocol to emphasize U.S. Government concern regarding these issues.

3. The United States can ratify the Final Acts with additional reservations that either state U.S. refusal to acquiesce to particular decisions taken at WARC-79, beyond those cited in earlier U.S. protocol statements, or set forth U.S. policy with respect to future actions by ITU or specific implementation of the WARC-79 Final Acts. While it is not uncommon for the Senate to attach conditions to a resolution of ratification of a bilateral international agreement, which the other party can readily accept or reject through its own ratification processes, attaching conditions to a multilateral agreement raises difficulties.

4. The United States can ratify the Final Acts in part, specifically withholding ratification of those provisions (which would have to be listed in precise detail) where the United States chooses to remain bound by the provisions of existing regulations previously ratified (which would also have to be listed in precise detail).

5. The United States can withhold ratification of the Final Acts pending the outcome of several important international conferences dealing with telecommunication issues. This would deny FCC and the current

administration any legal basis for implementing decisions taken at WARC-79, many of which were strongly advocated by the United States and fought for by the U.S. delegation, and which are scheduled for implementation by other ITU members on January 1, 1982. The most immediate international telecommunication conference of great importance to the Unites States is the September 1982 plenipotentiary. The actions taken at this conference to revise the ITU convention will be basic to all future conferences of ITU.

6. The United States can reject the Final Acts of WARC-79 in their entirety and announce that we intend to abide by the preexisting radio regulations, as amended. The consequences would be similar to those cited above.

Future Conferences and Issues

1982 Plenipotentiary

- This conference provides the United States with an opportunity to propose changes in the structures and procedures of ITU, and to resist changes proposed by others that are not in the interest of the United States. It is vital that the United States make thorough preparations for this meeting and to anticipate fully the proposals that may be put forward by other ITU members.

- The basic principles contained in the ITU convention will be reviewed and modifications made in accordance with the will of the majority. The convention serves to guide international cooperation for use of telecommunications of all kinds, and governs the functioning of ITU itself. Changes in the convention will be fundamental to future meetings of ITU. For example, any change in article 33 of the convention concerning use of the spectrum and the geostationary satellite orbit would have a direct bearing on the WARC scheduled to plan space services using the geostationary orbit.

- The United States should give careful consideration to the future role of ITU vis-a-vis international information policy issues and the New World information rrder demands of Third World countries.

The results of the OTA-sponsored survey shows that more than 80 percent of the respondants agree that the conflicting positions and approaches between the United States and other countries for use of the radio spectrum and the geostationary satellite orbit are issues for the 1982 ITU plenipotentiary conference and justify a major U.S. effort to prepare for the conference.

Space Planning Conference

- This specialized WARC on the use of the geostationary satellite orbit and the planning of space services utilizing it will have two sessions—July 1985 and September 1987. It poses a serious threat to potential U.S. use of space communications because it could result in a form of "planning" contrary to U.S. interests. The extent to which a flexible and efficient method of planning space services can be devised and "sold" to the conference represents a challenge to the United States.

- The conference will also determine which frequency bands used for space services are to be planned. U.S. efforts to have the conference concentrate on those higher frequency bands that are unoccupied, or little used, will collide with the demands of developing countries to have the conference concentrate on planning the use of the more economical, lower frequency bands. The United States must determine its own readiness to incur the expense of moving to higher frequencies and its readiness to understand the motivations and deal effectively with the pressures to plan a broad range of frequency bands.

HF Broadcasting Conference

- This conference, to be held in two sessions starting in January 1984, is to plan the efficient and equitable use of the HF broadcasting bands. Active U.S. participation and careful preparation will help ensure that the increased allocations to HF broadcasting made at WARC-79 are not jeopardized by failure to accommodate the fixed services that were removed from the international broadcasting bands, but must be reaccommodated in other parts of the spectrum.

- Rapid developments in direct broadcasting from satellites are likely to rekindle debate on such political issues as "prior consent" at the HF planning conference. The United States will need to be prepared to address this and other current issues over the question of the free flow of information.

1983 Broadcasting Satellite Conference for Region 2

- To prepare for the 1983 region 2 conference, the United States will need to develop its detailed requirements for broadcasting satellite channels and submit them to ITU a year in advance of the meeting. Also, the desired satellite coverage areas are required to be submitted. A U.S. position will need to be taken on the total bandwidth to be allocated to broadcasting satellites as opposed to satellites operating in the fixed satellite service in the 12 GHz band.

- The United States could be faced with the prospect of a majority of region 2 countries voting for a rigid orbital and frequency allotment plan such as the one adopted for regions 1 and 3 at the 1977 WARC for BSS. According to the OTA-sponsored survey, a majority of the respondents, 68 percent, believe that a practical compromise is possible and desirable, although relatively few have any specific concept of the form such compromise could take; an additional 15 percent believe that a compromise is possible, but undesirable; only 8 percent of the respondents believe that a compromise between the United States and the Third World positions on a priori assignment is impossible; another 9 percent expressed no opinion. This underscores the need to identify and analyze specific strategies and options which might provide the basis for such a compromise.

- WARC-79 made allocations for BSS from 12.3 to 12.7 GHz and for FSS from 11.7 to 12.1 GHz. Left to be resolved at the 1983 conference is the band 12.1 to 12.3 GHz allocated in 1979 to both services. Decisions surrounding the 1983 conference bear directly on the future growth of domestic satellite service. FSS and BSS both will be affected by these decisions. Domestic issues involving direct broadcasting satellites planned for operation in the 12-GHz band must be addressed as a part of the overall policy considerations by the United States.

Other Conferences

- The 10 additional administrative radio conferences to be held over the next 7 years include some that will be as important, if not more so, than WARC-79 itself. (Scheduling is tentative and some could be delayed by action of the ITU's administrative council and/or the 1982 plenipotentiary conference.) Some of these conferences offer the United States an opportunity to reopen the question of allocation proposals that were not accepted by WARC-79 (e.g., WARC for the mobile services in 1983).

- These future conferences offer a forum for the United States to reiterate the importance of the radiolocation service and to help resolve coordination problems arising from the sharing of bands with the fixed and mobile services.

- The following is a list of the future ITU conferences currently scheduled:

November 1981, 6 weeks, region 2, MF-BC RARC, second session;

August 1982, 4 weeks, region 1, FM-BC RARC, first session;
September 1982, 6 weeks, ITU Plenipotentiary Conference;
February 1983, 3½ weeks, Mobile Services WARC;
June 1983, 5 weeks, region 2, Broadcasting Satellite RARC;
January 1984, 5 weeks, HF-Broadcasting WARC, first session;
October 1984, 6 weeks, region 1, FM-BC RARC, second session;
July 1985, 6 weeks, Space Services WARC, first session;
January 1986, 7 weeks, HF-Broadcasting WARC, second session;
September 1986, 4 weeks, region 2, HF-Broadcasting RARC (New Bands);
January 1987, 4 weeks, African VHF/UHF-Broadcasting RARC;
September 1987, 6 weeks, Space Services WARC, second session;
March 1988, 6 weeks, region 3, VHF/UHF Bands RARC; and
September 1988, 6 weeks, Mobile Services WARC.

Acronyms, Abbreviations, and Glossary

Acronyms and Abbreviations

AFNAVSAT — Air Force Navigation Satellite
AM — amplitude modulation
ARFA — Allied Radio Frequency Agency (NATO)
AWACS — Airborne Warning and Control System
BSS — broadcasting-satellite service
C-E — communications-electronics (DOD parlance)
CCIR — International Radio Consultative Committee of the International Telecommunication Union
CCIs — reference to both the CCIR and CCITT
CCITT — International Telegraph and Telephone Consultative Committee of the International Telecommunication Union
CITEL — Inter-American Telecommunication Conference of the Organization of American States
COMSAT — Communications Satellite Corp.
COPUOS — The United Nations Committee on the Peaceful Uses of Outer Space
C^3I — command, control, communications, and intelligence (DOD parlance)
DNS — The Department of Defense Navigation Satellite System
DOD — Department of Defense
DSCS — Defense Satellite Communication System
ECAC — Electromagnetic Compatibility Analysis Center (DOD), Annapolis, Md.
EHF — extremely high frequency (30 to 300 GHz)
EIRP — effective isotropically radiated power (measured in watts)
EMC — electromagnetic compatibility
FAS — Frequency Assignment Subcommittee of the Interdepartment Radio Advisory Committee
FCC — Federal Communications Commission
FLTSATCOM — Fleet Satellite Communication System (Naval)
FM — frequency modulation
FMAC — Frequency Management Advisory Committee to the National Telecommunications and Information Administration
FSS — fixed satellite service
FX — fixed service
GHz — gigahertz (1 billion cycles per second)
GPS — global positioning satellite (sometimes NAVSTAR/GPS) (DOD)
HF — high frequency (3 to 30 MHZ)
Hz — hertz (one cycle per second)
IBI — International Bureau of Informatics
ICA — International Communications Agency
ICAO — International Civil Aeronautical Organization
IFL — International Frequency List
IFRB — International Frequency Registration Board
IMCO — Intergovernmental Maritime Consultive Organization
INMARSAT — International Maritime Satellite Organization
INTELSAT — International Telecommunications Satellite System
IRAC — Interdepartment Radio Advisory Committee
ITU — International Telecommunication Union
kHz — kilohertz (1000 cycles per second)
LF — low frequency (30 to 300 kHz)
LR — radiolocation service (fixed)
MF — medium frequency (300 to 3000 kHz)
MHz — megahertz (1 million cycles per second)
MO — mobile service
MR — radiolocation service (mobile)
NASA — National Aeronautics and Space Administration
NATO — North Atlantic Treaty Organization
NTIA — National Telecommunications

and Information Administration
RARC — Regional Administrative Radio Conference
RL — radionavigation service (fixed)
RO — radionavigation service (mobile)
SHF — super high frequency (3 to 30 GHz)
UHF — ultrahigh frequency (300 to 3000 MHz)
U.N. — United Nations
UNDP — United Nations Development Program
UNESCO — United Nations Educational, Scientific, and Cultural Organization
UPU — Universal Postal Union
VHF — very high frequency (30 to 300 MHz)
VLF — very low frequency (3 to 30 kHz)
WARC — World Administrative Radio Conference
WIPO — World Intellectual Property Organization

Glossary

A priori planning—procedure by which frequencies and orbital locations are allotted to individual countries according to a plan negotiated by member-nations and implemented by ITU.

Aeronautical mobile service—a mobile service between aeronautical stations and aircraft stations, or between aircraft stations, in which survival craft stations may participate; emergency position-indicating radiobeacon stations may also participate in this service on designated distress and emergency frequencies.

Aeronautical mobile-satellite service—a mobile-satellite service in which mobile Earth stations are located onboard aircraft; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.

Aeronautical radionavigation-satellite service—a radionavigation-satellite service in which Earth stations are located onboard aircraft.

Aeronautical radioavigation service—a radionavigation service intended for the benefit and for the safe operation of aircraft.

Allocation (of frequency band)—entry in the table of frequency allocations of a given frequency band for the purpose of its use by one or more terrestrial or space radiocommunication services or the radio astronomy service under specified conditions. This term shall also be applied to the frequency band concerned.

Allotment (of a radio frequency or radio frequency channel)—entry of a designated frequency channel in an agreed plan, adopted by a competent conference, for use by one or more administrations for a terrestrial or space radiocommunciation service in one or more identified countries or geographical areas and under specified conditions.

Amateur service—a radiocommunication service for the purpose of self-training, intercommunication, and technical investigations carried out by amateurs, i.e., by duly authorized persons interested in radio technique solely with a personal aim and without pecuniary interest.

Analog transmission—a technique that transmits the signal in a continuous electrical waveform. The information context of the signal is conveyed by the value or magnitude of some characteristics of the signal such as the amplitude, phase, or frequency of a voltage.

Assigned frequency—the center of the frequency band assigned to a station.

Assigned frequency band—the frequency band within which the emission of a station is authorized; the width of the band equals the necessary bandwidth plus twice the absolute value of the frequency tolerance. Where space stations are concerned, the assigned frequency band includes twice the maximum Doppler shift that may occur in relation to any point of the Earth's surface.

Assignment (of a radiofrequency or radiofrequency channel)—authorization given by an administration for a radio station to use a radiofrequency or radiofrequency channel under specified conditions.

Band—in radio, frequencies that are within two definite limits and are allocated for a definite purpose or service, e.g., the standard AM broadcast band.

Broadcasting-satellite service—a radio-communication service in which signals transmitted or retransmitted by space stations are intended for direct reception by the general public.

Broadcasting service—a radio-communication service in which the transmissions are intended for direct reception by the general public. This service may include sound transmissions, television transmissions, or other types of transmission.

CCIR—International Radio Consultative Committee, a permanent organ of ITU where member-nations and recognized private operating agents formulate recommendations concerning technical and operational radio matters.

CCITT—International Telegraph and Telephone Consultative Committee, a permanent organ of ITU where member-nations and recognized private operating agents formulate recommendations concerning technical, operational, and tariff aspects of telecommunication.

CCIR SPM—special preparatory meeting of CCIR convened in 1978 by the Secretary General of ITU to provide technical support to WARC-79.

dBW—a measure of power, decibels referenced to 1 watt.

Digital transmission—a technique that transmits the signal in the form of one of a discrete number of codes. The information content of the signal is concerned with discrete states of the signal, such as the presence or absence of a voltage, a contact in the open or closed position, or a hole or no hole in certain positions on a card.

Earth exploration-satellite service—a radio-communication service between Earth stations and one or more space stations, which may include links between space stations, in which: 1) information relating to the characteristics of the Earth and its natural phenomena is obtained from active sensors or passive sensors on Earth satellites; 2) similar information is collected from airborne or Earth-based platforms; 3) such information may be distributed to Earth stations within the system concerned; and 4) platform interrogation may be included. This service may also include feeder links necessary for its operation.

Emission—radiation produced, or the production of radiation, by a radio transmitting station.

Evolutionary planning approach—procedure by which frequency assignments and orbital locations are notified by member-nations and recorded by ITU on a more or less first-come, first-served basis without any rigid a priori plan.

Facsimile—a form of telegraphy for the transmission of fixed images, with or without halftones, with a view to their reproduction in a permanent form.

Feeder link—a radio link from an Earth station at a specified fixed point to a space station, or vice versa, conveying information for a space radio-communication service other than for the fixed-satellite service.

Fixed-satellite service—a radio-communication service between Earth stations at specified fixed points when one or more satellites are used; in some cases this service includes satellite-to-satellite links, which may also be effected in the intersatellite service; the fixed-satellite service may also include feeder links for other space radio-communication services.

Fixed service—a radio-communication service between specified fixed points.

Footnote—in the international table of frequency allocations a "footnote" conveys special information and often is a means by which an ITU member-nation may claim frequency band usage for a service that is in addition to or alternative to the service stated in the table of allocations.

Frequency allocation table (international)—a table in the radio regulations allocating bands for frequencies, in the usable portion of the radio spectrum, to radio-communication services.

Frequency allocation table (national)—a table in the FCC Rules and Regulations allocating bands of frequencies, in the usable portion of the radio spectrum, to radio-communication services.

Geostationary satellite—a geosynchronous satellite whose circular and direct orbit lies in the plane of the Earth's Equator and which thus remains fixed relative to the Earth; by extension, a satellite that remains approximately fixed relative to the Earth.

Geostationary satellite orbit—the oribit in which a satellite must be placed to be a geostationary satellite.

Geosynchronous satellite—an Earth satellite whose period of revolution is equal to the period of rotation of the Earth about its axis.

Harmful interference—interference that endangers the functioning of a radionavigation service or of other safety services or seriously degrades, obstructs, or repeatedly interrupts a radio-communication service operating in accordance with these regulations.

HF broadcasting—high frequency, or shortwave broadcasting, used primarily for government-sponsored information services (e.g., Radio Moscow, Voice of America), and for domestic broadcasting in many developing countries.

IFRB—International Frequency Registration Board, a permanent organ of ITU with five officials elected by the plenipotentiary conference, examines notifications of frequency assignments from member-nations for conformity with the radio regulations.

INTELSAT—International Telecommunication Satellite Organization with 106 member-nations that own and operate the satellites in the Global Communication Satellite System.

Interference—the effect of unwanted energy due to one or a combination of emissions, radiations, or inductions upon reception in a radio-communication system, manifested by any performance degration, misinterpretation, or loss of information that could be extracted in the absence of such unwanted energy.

International frequency list—a listing of all the frequencies in use in the world, as notified by administrations to the International Telecommunication Union.

IRAC—Interdepartment Radio Advisory Committee; a body of 20 Federal agencies and departments that assists NTIA in the development of the National Table of Frequency Allocations, the assignment of frequencies to stations operated by the Federal Government and other spectrum management functions.

IRAC Ad Hoc 144—the ad hoc group established within IRAC to develop recommended U.S. proposals for WARC-79 pertaining to the Federal Government use of the spectrum and to comment on U.S. position papers.

ITU—International Telecommunication Union; the U.N. related organization with responsibilities in the field of international telecommunications including spectrum management; present membership of 155 nations.

ITU Convention—the governing instrument of ITU that sets forth the structure and activities of the Union; only the plenipotentiary conference of ITU can amend or revise the Convention; it last met in Malaga-Torremolinos in 1973.

Land mobile-satellite service—a mobile-satellite service in which mobile Earth stations are located on land.

Land mobile service—a mobile service between base stations and land mobile stations, or between land mobile stations.

Maritime mobile-satellite service—a mobile-satellite service in which mobile Earth stations are located onboard ships; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.

Maritime mobile service—a mobile service between coast stations and ship stations, or between ship stations, or between associated onboard communication stations; survival craft stations and emergency position-indicating radiobeacon stations may also participate in this service.

Maritime radio-navigation-satellite service—a radio-navigation-satellite service in which Earth stations are located onboard ships.

Maritime radionavigation service—a radionavigation service intended for the benefit and for the safe operation of ships.

Meteorological aids service—a radio-communication service used for meteorological, including hydrological, observations and exploration.

Mobile-satellite service—a radio-communication service: 1) between mobile Earth stations and one or more space stations, or between space stations used by this service; or 2) between mobile Earth stations by means of one or more space stations.

Mobile service—a radio-communication service between mobile and land stations, or between mobile stations.

Orbit—the path, relative to a specified frame of reference, described by the center of mass of a satellite or other object in space subjected primarily to natural forces, mainly the force of gravity.

Permissible interference—interference at a higher level than that defined as permissible interference and which has been agreed upon between two or more administrations without prejudice to other administrations.

Permitted service—a class of allocation. Permitted and primary services have equal rights, except that in the preparations frequency plans, the primary service should have prior choice of frequencies (printed in "grotesque light" type in the ITU table of allocations.)

Plenipotentiary conference—the supreme body of ITU that has the power to amend or revise the ITU convention.

Power flux density—a measure of the power radiated by a transmitter, used as a constraint on certain services to protect other services in a shared band.

Primary service—a class of allocation. Stations in a primary service may not cause harmful interference to stations in the same, or another primary service, and can claim protection from interference from stations in primary, permitted, and secondary services. Printed in solid capitals in the ITU table of allocations.

Private operating agency—any individual or company or corporation, other than a governmental establishment or agency, which operates a telecommunication installation intended for an international communications service or capable of causing harmful interference with such a service.

Radar—a radiodetermination system based on the comparison of reference signals with radio signals reflected, or retransmitted, from the position to be determined.

Radiation—the outward flow of energy from any source in the form of radio waves.

Radio—a general term applied to the use of radio waves.

Radio astronomy service—a service involving the use of radio astronomy.

Radio Regulations, Geneva, 1979—the Final Acts of WARC-79 will constitute the Radio Regulations, Geneva, 1979 and enter into force on January 1, 1982, for those countries that have formally adopted the Final Acts.

Radio waves or hertzian waves—electromagnetic waves of frequencies arbitrarily lower than 3000 GHz, propagated in space without artificial guide.

Radio communication—telecommunication by means of radio waves.

Radio-communication service—a service involving the transmission, emission, and/or reception of radio waves for specific telecommunication purposes.

Radiodetermination—the determination of the position, velocity, and/or other characteristics of an object, or the obtaining of information relating to these parameters, by means of the propagation properties of radio waves.

Radiodetermination-satellite service—a radio-communication service for the purpose of radiodetermination involving the use of one or more space stations.

Radiodetermination service—a radio-communication service for the purpose of radiodetermination.

Radiolocation—radiodetermination used for purposes other than those of radionavigation.

Radiolocation service—a radiodetermination service for the purpose of radiolocation.

Radionavigation—radiodetermination used for the purposes of navigation, including obstruction warning.

Radionavigation-satellite service—a radio-determination-satellite service used for the purpose of radionavigation.

Radionavigation service—a radiodetermination service for the purpose or radionavigation.

Recognized private operating agency—any private operating agency, as defined above, which operates a public correspondence or broadcasting service and upon which the obligations provided for in article 44 of the convention are imposed by the member in whose territory the head office of the agency is situated, or by the member that has authorized this operating agency to establish and operate a telecommunication service on its territory.

Regions of ITU—for the allocation of frequencies, the world has been divided into three regions by ITU. Exact boundaries of the regions are given in the radio regulations; a general description follows: *region 1*—Europe, Africa, the U.S.S.R., Turkey, the Territory of the Mongolian People's Republic, and areas to the north of the U.S.S.R.; *region 2*—North, Central, and South Americas, the Caribbean, and Greenland; and *region 3*—Asia, Oceania, Australia, and New Zealand.

Safety service—a radio-communication service used permanently or temporarily for the safeguarding of human life and property.

Satellite—a body that revolves around another body of preponderant mass and that has a motion primarily and permanently determined by the force of attraction of that other body.

Satellite link—a radio link between a transmitting Earth station and a receiving Earth station through one satellite.

Satellite system—a space system using one or more artificial Earth satellites.

Secondary service—a class of allocation. Stations on a secondary service may not cause interference to stations in a primary or secondary service, and may not claim protection against interference from stations in a primary service existing or subsequently installed. Printed in upper and lower case in the ITU table of allocations.

Services—a functional use of the radio spectrum where designated frequency bands are allocated for particular uses, e.g., broadcasting service, radiolocation service.

Space-radio communication—any radio communication involving the use of one or more space stations or the use of one or more reflecting satellites or other objects in space.

Space research service—a radio-communication service in which spacecraft or other objects in space are used for scientific or technological research purposes.

Space system—any group of cooperating Earth stations and/or space stations employing space-radio communication for specific purposes.

Telecommunications—any transmission, emission, or reception of signs, signals, writing, images, and sounds or intelligence of any nature by wire, radio, optical, or other electromagnetic systems.

Telegram—written matter intended to be transmitted by telegraphy for delivery to the addressee. This term also includes radiotelegrams unless otherwise specified.

Telegraphy—a form of telecommunication that is concerned in any process providing transmission and reproduction at a distance of documentary matter, such as written or printed matter or fixed images, or the reproduction at a distance of any kind of information in such a form. For the purposes of the radio regulations, unless otherwise specified therein, telegraphy shall mean a form of telecommunication for the transmission of written matter by the use of a signal code.

Telephony—a form of telecommunication set up for the transmission of speech or, in some cases, other sounds.

Television—a form of telecommunication for the transmission of transient images of fixed or moving objects.

Terrestrial radio communication—any radio communication other than space-radio communication or radio astronomy.

WARC-77—a specialized World Administrative Radio Conference that met in Geneva in the winter of 1977 to plan for the broadcasting-satellite service in the band 11.7 to 12.5 GHz.

WARC-79—a General World Administrative Radio Conference that met in Geneva in the fall of 1979 to revise the international radio regulations of ITU.

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